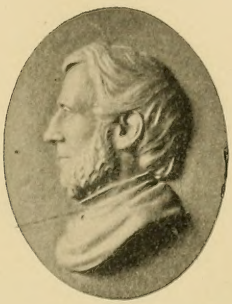
TORREYA

A Monthly Journal of Botanical Notes and News



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BY

MARSHALL AVERY HOWE

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* Resigned October 10, 1905.

† Elected November 14, 1905.

ERRATA, VOLUME 5

Page 11, 12th and 13th lines from the bottom, *for* only one embryo-sac in each ovule *read* only one egg-apparatus in the embryo-sac.

Page 110, in title and 9th line from bottom, for *Stigeocloneum*, read *Stigeoclonium*.

Page 111, 2d line, for *Stigeocloneum*, read *Stigeoclonium*.

Page 119, 5th line from bottom, for *Myrmicocystis* read *Myrmecocystus*.

Page 120, 4th line from bottom, for *pruniasus* read *pruniosus*.

Page 121, 12th line, for *Coxinella* read *Coccinella*.

Page 196, 7th line, *for* 2,000, *read* 2,500.

Page 205, 2d line, *for* J. N. Painter, *read* J. H. Painter.

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TORREYA

January, 1905

DISCONTINUOUS VARIATION AND THE ORIGIN OF SPECIES*

By D. T. MacDougal

That distinct and separate qualities expressed in recognizable external characters may appear suddenly, or disappear completely, in a series of generations of plants, has been a matter of common observation so long that it would be difficult to hunt out and fix upon the first instance of record.

The significance of such phenomena was obviously beyond the comprehension of the earlier botanists and it is evident that a rational recognition of the phylogenetic value of sports and anomalies necessarily awaited the development and realization of the conceptions of unit-characters of the minute structures which are the ultimate bearers of heredity, and of the inter-dependence of the two in such manner as to constitute actual entities as embodied in Darwin's pangenesis, de Vries' intra-cellular pangenesis and in Mendel's investigations upon heredity. It is equally apparent that a proper interpretation of the facts in question, and their distinction from the results of hybridization was possible only by means of the analysis of the collated results of observations upon series of securely guarded pedigree-cultures, in which the derivation of all of the individuals of several successive generations had been noted. For it is now thoroughly realized that the main questions of descent and heredity and of evolution in general are essentially physiological, and as such their solution is to be sought in experiences with living organisms and not by deductions from illusory "prima facie" evidence, which has been so much in vogue in evolutionary polemics, nor

* Address delivered by invitation before the American Society of Naturalists at Philadelphia, December 28, 1904.

[Vol. 4, No. 12, of TORREYA, comprising pages 177–201, was issued December 30, 1904.]

by " interpretations of the face of nature " with the accompanying inexact methods and superficial considerations. It was upon the safe basis of the first-named conceptions, and by means of the methods entailed that de Vries has so successfully grappled with the problems involved in the investigation of the part played by discontinuous variation in evolution.

In view of the amount of orderly and well-authenticated evidence now at hand, it may be assumed as demonstrated that characters and groups of characters of appreciable physiological value, originate, appear in new combinations, or become latent, in hereditary series of organisms in such manner as to constitute distinct breaks in descent.

This is the main thesis of the mutation theory : the saltatory movements of characters, regardless of the taxonomic value of the resultant forms. That the derivatives might be considered as species by one systematist, and varieties by another is quite incidental and of very little importance. The main contention lies in the claim that characters of a definite nature appear, and become inactive suddenly, and do not always need thousands of years for their infinitely slow external realization, or for their gradual disappearance from a strain.

Of course the principal corollary of the mutation-theory is that the saltations in question do result in the constitution of new species and varieties. As a matter of interest it may be stated that all of the systematists who have seriously examined the adult mutants of the evening-primroses cultivated in the New York Botanical Garden have held the opinion that certain ones were to be considered as species and others as varieties.

Furthermore, these conclusions are confirmed when the characters of the mutants are subjected to statistical methods of investigation. In the observations of Dr. Shull, which will be presented more fully before the Botanical Society of America, it has been found that qualities of the mutants, susceptible of measurement, depart definitely and clearly from the parental type and fluctuate about a new mean, and do not intergrade with the parental form. The amplitude of fluctuation about the new center is greater than that of correspondent parental qualities,

and the degree of correlation is much less in the mutants than in the parent. This is seen by inspection to be true in one species during the first year of its existence, and is confirmed by the exact observations on other forms a dozen years after their mutative origin. Consequently the features in question may not be taken to be in any way the result of selection but are in themselves new qualities.

Lamarck's evening-primrose offers such striking and easily recognizable examples of discontinuous variation, and has been the object of so much detailed study that we are in danger of giving way to the supposition that the mutation-theory rests upon the facts obtained from this plant alone. It is to be said, however, that if it and all of its derivatives were destroyed, the results of experimental studies which have been made upon mutations in other species, upon the behavior of retrograde and ever-sporting varieties, the occurrence of systematic atavism, and of taxonomic anomalies, pelories and other morphological features would furnish ample support for the conception of unit-characters, and serve to establish the fact that mutations have occurred in a number of species representing diverse groups.

It is now becoming plainly apparent that the phenomena of hybridization, by the opportunities afforded for the study of the included unit-characters in a segregated condition, for the analysis of complex characters, and of the various principles governing the transmission, activity, dominancy, latency and recessivity of characters, promise to yield results of the first magnitude concerning the mechanism of descent and heredity. The possibilities of crosses between species comparatively widely different in morphological and physiological constitution among plants indicate that the ultimate generalizations upon hybridism will find broader exemplification in plants than in animals.

It is pertinent to point out in this connection that the unguarded use of the terms "variation" and "mutation" to designate phenomena of segregation and alternative inheritance when races or species are thrown together in a hybrid strain is bound to result in much confusion, especially in dealing with plants, since it is well known that direct mutants of either parent occasionally occur in such mixed strains.

From this last consideration we pass naturally to a discussion of the nature of the material which may be of use in the study of fluctuating and discontinuous variability. It needs no argument to support the assertion that a successful experimental analysis of the behavior of separate characters may be carried out only when dealing with series of organisms fluctuating about a known mean with a measurable amplitude of variability.

Systematic species as ordinarily accepted generally consist of more than one independent and constant sub-species, or elementary species which may not be assumed to interbreed or intergrade, unless actually demonstrated to do so by pedigreed cultures. So far, but few elementary species have been found to interbreed. A due recognition of this simple fact would save us a vast amount of pyramidal logic resting on an inverted apex of supposition.

Again the accumulation of observations upon the prevalence and effect of self- and cross-fertilization has totally unsettled the generalizations current within the last few decades. Briefly stated, a moderate proportion of the flora of any region is autogamous, a large proportion both autogamous and heterogamous, and a moderate proportion entirely heterogamous. The relative number of species included in the categories indicated varies greatly in different regions. To assert the deleterious effects of self-fertilization, of all or a majority of plants, is to base a statement upon evidence that lacks authentication and correlation, as has been strikingly demonstrated by recent results. As a matter of fact no phase of evolutionary science is as badly in need of investigation as that which concerns the effects of close and cross-breeding.

It is also to be said that current misconceptions as to the extreme range of fluctuating variability of many native species have arisen from a failure to recognize the composite nature of the Linnaean, or group-species, upon which observations have been based, as I have found with the common evening-primrose.

The demands of ordinary floristic work are usually met by the formulation of collective species, which are in fact, an undeniable convenience, and necessity perhaps, for the elementary teacher and

the amateur. Upon the specialist in any subject rests the obligation to furnish his non-technically trained constituency with conceptions of the facts and principles within the domain of his investigations, which will be inclusive, and easy of comprehension. But if in accordance with this requirement, the systematist contents himself with this looser, and with due regard it may be said, more superficial treatment, and does not delineate clearly the elementary constituents of a flora, or falters in carrying his analysis of relationships to its logical end, he fails notably in the more serious purpose of his investigations, and his work must be supplemented and extended before it becomes an actual basic contribution to the physiologic or phylogenetic branches of the science. To study the behavior of characters we must have them in their simplest combinations. To investigate the origin and activity of species we must have them singly and uncomplicated.

Lastly, we may turn to a phase of the subject which has, as yet, received nothing but speculative consideration — that of the causes which induce the organization of new characters and which stimulate their external appearance. The recurrence of the known mutants of Lamarck's evening-primrose, and the occurrence of new mutants of other species has taken place in New York and Amsterdam under conditions that lead to the definite conclusion that a favorable environment including the most advantageous conditions for vegetative development and seed-production facilitates the activation and appearance of latent qualities; and the inference lies near at hand that such conditions also facilitate the original organization of new unit-characters or changes in these entities. We conclude therefore that favorable environment promotes the formation of new species as suggested by Korshinsky, and that new species do not arise under the stress of infra-optimal intensities of external factors as proposed by Darwin.

Furthermore it has been found that certain qualities arise and disappear more numerously, and presumably more readily than others in a mutating strain. Thus, those embodied in the mutants *Onagra* (*Oenothera*) *oblonga*, and *nanella* find external reali-

zation in many more individuals than those which constitute the differentiating features in *rubrinervis*, *scintillans*, *gigas*, *elliptica*, *subovata*, and others.

Again the inspection of the cultures made in Amsterdam and New York demonstrates that the last-named locality offers more favorable soil and climate for the evening-primroses. Correlated with this I am able to report that careful attention to the cultures has resulted in an increase of the proportion of mutants from the five per cent. maximum of de Vries to more than six per cent. in the last season, in the American cultures, and to say that some forms which did not reach maturity, and others which did not occur, in Amsterdam, may find in New York a climate in which they carry out their entire development. The cultures of Lamarck's evening-primrose now being carried on include 14 recognizable mutants, and it is pertinent to state that I have mutants of other species which will be duly described after they have completed a cycle of development.

All components of the environment may not be taken to be of equal value in the induction of new qualities, and I by no means wish to give the impression that the problem is on the point of being solved, but our hopes have been raised to the highest pitch that we may soon be able to discern the factors more or less directly concerned.

To be able to bring the causes operative in the formation and structural expression of qualities, that is, the moving forces of evolution, within the range of experimental investigation would be a triumph worthy the best effort of the naturalist; in that it would give us the power to give new positions to qualities and thus produce new organisms, its importance would rank well with that of any biological achievement of the last half century.

New York Botanical Garden.

A PASPALUM NEW TO THE WEST INDIES

By George V. Nash

In working over some grass material secured by Mr. A. H. Curtiss (no. 379) on the Isle of Pines, just to the south of Cuba,

an interesting species of the genus *Paspalum* was encountered. It was impossible to correlate this with any of the known species of the West Indies, and a search among the South American forms revealed several specimens of a species from Brazil, the *Paspalum lineare* of Trinius. One of these specimens is no. 763 of Mr. Spencer Moore, who secured it in the Matto Grosso region. It was upon this number that Mr. Moore founded his *Panicum furcellatum* (Trans. Linn. Soc. II. **4**: 505. *pl. 34. f. 14–22*), and I am at a loss to understand why the grass was described as a *Panicum*, for it has all of the characters of a *Paspalum*, as now understood,— a secund inflorescence and a spikelet of three scales — unless it be the occasional presence of a small fourth scale, an occurrence not uncommon in *Paspalum*. The specimen of Moore's 763, referred to above, which is in the herbarium of Columbia University, has but one or two of the spikelets with a fourth scale, the remainder possessing but three scales. Mr. Moore remarks that his species is "treacherously like *Paspalum tropicum* Doell and *P. Neesii* Kth.," and if Mr. Moore considers *Paspalum Neesii* Kth. synonymous with *P. lineare* Trin., I must consider the resemblance most treacherous, for I cannot distinguish the grasses.

Mr. Moore's plant came from Santa Cruz, better known in that region as Barra dos Bugres, a small town about one hundred miles to the northwest of Cuyabá. The specimen upon which *Paspalum lineare* was based was said by its author, Trinius, to have been secured by Langsdorff in Brazil, but no more definite location was given. In 1825, the Langsdorff expedition, of which Riedel was botanist, passed through the Matto Grosso region. Langsdorff and Riedel journeyed together as far as Cuyabá, where they separated, the latter proceeding eastward, while the former went to the northward, along the Arinos and Tapajos rivers. This course would have carried Langsdorff within a few miles of Santa Cruz, at which place Mr. Spencer Moore, sixty-seven years later, secured the material upon which he based his *Panicum furcellatum*.

A word as to the rather complicated history of the names which have been applied to this plant may not be out of place.

Trinius in 1826 (Gram. Pan. 99) published two species of *Paspalum*. The first of these appears as follows: "*Paspalum angustifolium* N. ab Es.! in Mart. Fl. Bras. ined." He remarks that it is similar to the following species, *P. lineare*, but differs especially in the smaller rugose spikelets; and remarks further that the name must be changed on account of the earlier name of Le Conte. In 1828, Trinius (Sp. Gram. Ic. 111) figures and again describes his *Paspalum lineare*, and cites, as of doubtful synonymy, the *P. angustifolium* N. ab Es. of his own publication (Gram. Pan. 99), adding in a footnote that what he had received previously under this name from Nees himself appears to be a different species on account of the much smaller spikelets which are subrotund-oblong, transversely rugose and without hairs at the base. The plate accompanying this description bears the name *Paspalum angustifolium*. In 1829 Nees (Fl. Bras. Enum. 64) published a *Paspalum angustifolium* which, judging from the description, is identical with the *Paspalum lineare* of Trinius, published three years previously, and indeed he makes the following citation: "*Paspalum lineare* Trin. ined." At the same time he publishes a variety β, characterizing it thus: "glumis transversim undulatis." As this rugose character of the spikelet was employed by Trinius in his publication of *P. angustifolium* to distinguish it from his *P. lineare*, Nees, by his procedure, attempted exactly to reverse the order of things. But whether Trinius was right or wrong in interpreting Nees really is of little consequence, for priority requires that we take up the species as characterized by Trinius in 1826; so the *Paspalum angustifolium* Nees (Fl. Bras. Enum. 64) becomes synonymous with *P. lineare* Trin., and the variety β must be considered the same as the *P. angustifolium* Nees (Trin. Gram. Pan. 99). In 1829 Kunth (Rev. Gram. 1 : 25), probably aware that the name *angustifolium* was antedated by that of Le Conte, proposed another name for the species in the following manner: "*Paspalum Neesii*. (*Paspalum angustifolium* Nees ab Esenb.) Brasilia." He does not designate whether he meant the name published by Trinius for Nees or that published by Nees himself, so the former must be understood.

In the Index Kewensis the three names under discussion are

considered synonymous, and the two former, *P. angustifolium* and *P. lineare*, published in 1826, are referred to the *P. Neesii* Kunth, described in 1829, a rather queer procedure, where the rule is that the oldest binomial shall be taken up, for certainly, if it is necessary to unite *P. angustifolium* and *P. lineare*, the former being invalidated by the earlier publication of Le Conte's name, *P. lineare* is available.

New York Botanical Garden.

ONAGRA GRANDIFLORA (AIT.)* A SPECIES TO BE INCLUDED IN THE NORTH AMERICAN FLORA

By Anna Murray Vail

In searching through several herbaria for specimens of *Onagra Lamarckiana* that had grown wild in North America, it became apparent that there was a large-flowered evening-primrose which, though closely related to *O. Lamarckiana*, could not be referred to that plant as it is known in Europe in the wild state and in cultivation.

The reference by Bartram † to a large-flowered evening-primrose seen near Tensaw, Alabama, suggested the possibility of finding the plant still growing in the locality where he found it in August, 1776. Professor S. M. Tracy kindly undertook the search for it, and on August 16, 1904, he re-discovered the locality, and the plant, described so vividly by Bartram as "the most pompous and brilliant herbaceous plant yet known to exist."

Abundant material was sent to the New York Botanical Garden and extensive cultures of *O. grandiflora* have been begun, in an attempt to establish its relation with its allies. Further details will be included in an article now in press.

Oenothera grandiflora Ait. was based on a plant introduced from North America by John Fothergill in 1778. The plate

* **Onagra grandiflora** (Ait.) = *Oenothera grandiflora*, Ait. Hort. Kew. 2: 2. 1789.

† Bartram, William. Travels through North and South Carolina, Georgia, East and West Florida, the Cherokee Country, the extensive territories of the Muscogulges or Creek Confederacy, and the Country of the Chactaws. Dublin, 1793 (reprinted from the Philadelphia edition of 1791), p. 404.

cited after the description (L'Héritier, Stirp. Novae, 2, *pl. 2*) was never published, and repeated search for the original drawing or a copy of the unpublished plate has not been successful.

An herbarium specimen of "*Oenothera grandiflora* MSS. Ait. Hort. Kew **2** : 2" from "Hort. Fothergill 1778" is preserved in the Herbarium of the British Museum, and a traced drawing of this specimen was procured for the Garden by Dr. H. H. Rusby in August, 1904. A close comparison of the herbarium specimens of the Alabama plant collected by Tracy and the tracing of the Fothergill plant show them to be identical, and the evidence is fairly conclusive that the *Oenothera grandiflora* Ait., so well and so long established in cultivation, originated from seeds sent to Fothergill by William Bartram after his famous travels through the southern United States.

The Alabama plants were shown to Professor de Vries when he passed through New York in October, 1904, and he unhesitatingly stated that they did not in the least resemble the *Oenothera Lamarckiana* of his experiments.

Just what is the relationship of *Onagra grandiflora* (Ait.) from Alabama, with other large-flowered species in general cultivation, remains to be investigated. The historical records of *Onagra grandiflora* are numerous and most complicated, but it is of undoubted interest at the present time to find the plant spoken of by Bartram still growing in the same locality observed by him more than a century and a quarter ago, and to find it still true in every way to the characters as described by him at the time, and which are now still further emphasized by the tracing of the plant grown by Fothergill in 1778.

New York Botanical Garden.

SHORTER NOTES

Carex Underwoodii sp. nov.— Stout, glabrous; culm sharply trigonous, 1 m. high or more, roughish above. Leaves about as long as the culm, 1–2 cm. wide, slightly rough-margined: spikes clustered at the summit, the pistillate 4, linear-cylindric, 4–5 cm. long, about 8 mm. in diameter, the lowest on a slender stalk about 2 cm. long, the others sessile or nearly so: staminate

spike 1, very nearly sessile, 4 cm. long, 4 mm. thick: perigynia a little inflated, 5 mm. long, narrowly ovoid, strongly several-ribbed on both sides, narrowed into a short beak, with 2 subulate nearly erect teeth about 1 mm. long; scales pale green, 3-nerved, a little shorter than the perigynia, ovate, ciliate-margined, tipped with an awn about 2 mm. long.

In *Sphagnum*, Salt Hill Marsh, Content Road to Cinchona, Jamaica, *L. M. Underwood*, January 29, 1903 (*no. 158*). Related to *C. hystricina* Muhl., but very much larger and broader-leaved, the perigynia less inflated, their beak shorter and its teeth longer. In Urban, Symb. Ant. **2**: 159, Mr. C. B. Clarke records the occurrence of *C. hystricina* at Salt Hill, Jamaica; I have not seen the specimen that he cites (Herb. Bot. Dept. Jam. 2081), but I suppose it represents the species here described, which is certainly distinct from the widely distributed plant of eastern North America. N. L. Britton.

Twin Pine Embryos. — Apart from polyembryony resulting from adventitious buds on the nucellus, as exhibited in *Citrus* and a few other genera, it would seem probable that a plant like the pine, which produces regularly several archegonia in its prothallus, would more often have several embryos in the same seed than would plants which produce normally only one embryo-sac in each ovule. But apparently twin or triplet embryos are very rare in the pine; my classes handle hundreds of pine seeds and seedlings each term, yet the twin embryos figured in the accompanying drawings are the only ones I have happened to see. It may be an instance of "having eyes and seeing not"; if so, will some one kindly enlighten me? Ida Clendenin.

Twin Embryos of Pine

a, Embryos before cotyledons had entirely emerged from endosperm; *b*, larger embryo, with five cotyledons; *c*, smaller embryo, with three long and two short cotyledons.

Brooklyn, N. Y.,
December, 27, 1904.

REVIEWS

Proceedings: International Conference on Plant Breeding and Hybridization*

An international conference on plant breeding and hybridization was held in New York City, September 30 and October 1 and 2, 1902, and the papers there presented, together with the discussion on them, have been collected and published by the Horticultural Society of New York as Memoirs, Vol. 1, under the editorship of the secretary of the society, Leonard Barron.

The programme of the meeting as given in the Memoirs was long as well as comprehensive. Thirty papers were read, thirteen additional were read by title, and all of these save one are given in the report of the conference.

Some idea of the scope of the work presented can be had if the titles of half a dozen papers, chosen at random, are given. Professor William Bateson, Cambridge, England, gave "Practical Aspects of the new Discoveries in Heredity"; Mr. W. A. Orton, U. S. Dept. of Agriculture, "On the Breeding of Disease-resistant Varieties"; Mr. L. C. Corbett, U. S. Dept. of Agriculture, "Improvement of Roses by Bud Selection"; Professor William Saunders, Director of the Central Experimental Farm, Ottawa, Canada, "Results of Hybridization and Plant Breeding in Canada", and, to cite but one additional title, M. P. de Vilmorin, Paris, France, "The everbearing Strawberry."

Naturally the work of the earlier hybridizer, Gregor Mendel, was repeatedly referred to and was the central idea of several papers, particularly those of Bateson and de Vries.

Professor Bateson presented his now well-known views on the nature of the sex cells, or gametes, and their relation to the segregation of inheritable characters. He showed, among other things, that hybrids with certain characters fixed arise by the union of equivalent gametes (equivalent as regards the character in question), to use his terminology such are homozygotes, and that, on the other hand, unstable hybrids are produced as a result of the union of gametes unlike as being bearers of the char-

* Proceedings International Conference on Plant Breeding and Hybridization. Memoirs Hort. Soc. New York, 1 : 1–271. 1904.

acters in question, or such are heterozygotes. It appears to the reviewer that Professor Bateson's terminology is peculiarly fit, avoiding such circumlocution as "a hybrid with fixed character," meaning a homozygote, or "a hybrid with variable characters," meaning a heterozygote.

Professor Bateson speaks of two subjects, but does not discuss them at length, which are the theses of a paper by de Vries, "On artificial atavism," namely, the resolution of compound characters and the reformation of compound characters through the combination of simpler ones.

Without going into this interesting subject in detail, it can be said that Professor de Vries by beautiful experiments shows that characters apparently simple may be separated into more elemental ones, and conversely by the combination of the latter the compound character may be restored. In case the latter is an ancestral character the phraseology "artificial atavism" is well taken.

Generally speaking, the plant breeders had not taken advantage of the Mendelian theory in their work, and some of them did not know of Mendel or of his experiments before the Conference. As exceptions to this statement must of course be included the plant breeders from the Department of Agriculture, and of these notably Spillman, whose studies on wheat hybrids are well known. Curiously enough, the work of Spillman was not presented at the Conference.

Although hybridization formed the theme of perhaps most of the papers, not a little of the work was based on selection alone, or on selection as an aid to hybridization. The experiments of Orton, for instance, by which wilt-resistant varieties of cotton, watermelon and cow peas were obtained, consisted merely in the selection of individuals which were not subject to the disease in spite of the fact that they were growing in fields where it abounded. Roberts, on the other hand, succeeded in securing improved varieties of wheat by a system of crossing combined with rigid selection, and the same is true of other workers.

Interesting instances of the improvement of varieties by means of bud selection were also given. Powell, for example, selected

buds from the portions of apple trees which had superior fruit and used them as scions for grafting on more hardy stock. As a result of the third selection (generation) he obtains an apple which has the excellence of flavor of the earlier fruit to which has been added greater vigor and hardiness of the tree and greater uniformity of fruit.

Altogether, the report of the Conference will be very helpful to plant breeders as well as to those who are more particularly interested in the theoretical phases of the subject, and the Horticultural Society is to be congratulated on its excellent appearance.

W. A. Cannon.

PROCEEDINGS OF THE CLUB

Wednesday, November 30, 1904

The meeting was called to order at the usual hour at the New York Botanical Garden, Professor L. M. Underwood in the chair; twenty members present.

A painting of the Gloriosa Lily (*Methonica superba*) was received through President Brown from Mrs. Annie Eliza Scott Guerritore, of Naples, Italy. On motion a vote of thanks was ordered transmitted to Mrs. Guerritore and the picture was turned over to the Botanical Garden for exhibition purposes.

The following were elected to membership: Miss Mabel Denton of Paterson, N. J.; Mr. C. B. Robinson of New York City, and Dr. G. H. Shull of Cold Spring Harbor, N. Y.

The first paper on the scientific program was entitled "Recent Contributions to our Knowledge of Paleozoic Seed Plants" and was by Edward W. Berry.* It consisted of a brief discussion of recent contributions to our knowledge of those Paleozoic pteridophytes which had formed, or approximated the seed habit, the work of Professors Scott, Oliver, Kidston, Grand' Eury, Zeiller, and Renault. Especial attention was given to the work of Scott and of Oliver and to what amounted to a demonstration by them of seed-bearing in the Cycadofilicean genus *Lyginodendron* (*Sphenopteris*). Discussion by Drs. Britton and MacDougal followed.

* This paper was published in full in Torreya for December, 1904.

C. B. Robinson presented "Remarks on the Flora of Northern Cape Breton." To the north of the Bras d'Or Lakes, the island of Cape Breton consists of hills 800 to 1,500 feet in height, bordered by lowland of no great width along much of both coasts and in the numerous river valleys. The interior of the island is a plateau with large areas covered by barrens and sphagnum bogs. In passing eastward from New Brunswick to Nova Scotia, the flora becomes distinctly poorer, many species dropping out and few new ones appearing. Cape Breton with a smaller area than the rest of the province and forming its northeastern limit shows a further decrease, although a comparatively large number of forms are known from the island that do not occur on the mainland, while others grow more luxuriantly there, even at the extreme north. Among the former may be mentioned *Samolus floribundus* H. B. K. *Peramium Menziesii* (Lindl.) Morong, *Parnassia parviflora* DC., and *Galium kamtschaticum* Steller; among the latter, *Cypripedium reginæ* Walt., *Caltha palustris* L., *Anemone canadensis* L., *Blephariglottis Blephariglottis* (Wild.) Rydb., *Vagnera stellata* (L.) Morong, and *Rubus Chamæmorus* L. The dwarf mistletoe *Razoumofskya pusilla* (Peck) Kuntze, apparently of wide distribution in northern Nova Scotia, extends at least fifty miles up the west coast of the island.

The ferns are also noteworthy. All the common and a majority of the rarer species of the mainland grow at least as well in Cape Breton, together with two additional species *Dryopteris Filix-mas* (L.) Schott and *Polystichum Lonchitis* (L.) Roth, the former widely distributed, but the latter known only from two widely separated localities. Discussion by Drs. Britton, MacDougal and Barnhart followed.

The third paper by Le Roy Abrams was entitled "Notes on the Flora of Southern California." After speaking briefly of the topography and general climatic conditions of southern California Mr. Abrams called attention to the extreme variation in the flora and exhibited a series of specimens illustrating the coastal and mountain floras. Among these specimens were three of his recently described new species: *Cheiranthus suffrutescens*, *Heuchera elegans* and *Godetia Dudleyana*.

Other especially interesting plants exhibited were *Romneya trichocalyx* Eastw., *Quercus Engelmanni* Greene, and *Calochortus Catalinæ* Wats.

The paper was discussed by Dr. Britton and Mr. Nash.

Adjournment followed.

EDWARD W. BERRY,
Secretary.

NEWS ITEMS

Mr. William R. Maxon of the U. S. National Museum is spending several months in Guatemala, engaged in researches for the Bureau of Plant Industry.

With the January number, *The Plant World* passes under the management and editorship of Professor Francis E. Lloyd, of the Teachers College, Columbia University.

Professor H. Harold Hume, recently of the University of Florida, is now horticulturalist of the State Board of Agriculture of North Carolina, with headquarters at Raleigh.

F. M. Rolfs, lately of the Colorado Agricultural Experiment Station, has been appointed professor of botany and horticulture in the University of Florida, Lake City, Florida.

Professor F. S. Earle, director of the Estación Central Agronómica de Cuba, spent the last two weeks of December in New York and Philadelphia, sailing for Cuba again on the 31st.

At the December convocation of the University of Chicago, two candidates in botany, Minton Asbury Chrysler and Clifton Durant Howe, received the degree of doctor of philosophy.

The Apteryx, a quarterly devoted to natural history, published by the Roger Williams Park Museum of Providence, Rhode Island, C. Abbott Davis, editor, begins its existence with the number for January, 1905.

The daily papers announce the death of Rev. F. D. Kelsey, pastor of the Central Congregational Church of Toledo, Ohio, and formerly professor of botany in Oberlin College, at the age of fifty-six years.

Miss Anna M. Clark (A. M., Columbia University, 1904), author of a descriptive work on "The Trees of Vermont," has been appointed teacher of "science and nature study" in the New York City Training School for Teachers.

We learn from *Science* that Dr. W. A. Kellerman, professor of botany in the Ohio State University, will spend the months of January, February and March in Guatemala, studying and collecting the parasitic fungi of that country.

At the annual meeting held on January 10, Judge Addison Brown resigned the presidency of the Torrey Botanical Club, after completing fifteen years of service in that office. Dr. H. H. Rusby was chosen as his successor.

The Boston Evening Transcript notes that Mr. C. G. Pringle has recently returned to the University of Vermont with a collection of 25,000 specimens of plants, representing about 600 species, secured during an eight months' visit to Mexico.

Dr. Burton E. Livingston, instructor in plant physiology in the University of Chicago, has accepted an appointment to a position in the Bureau of Soils of the United States Department of Agriculture and expects to begin his new duties on April 1.

The American Mycological Society held meetings in Philadelphia during the Christmas holidays in connection with the American Association for the Advancement of Science and other affiliated societies. The officers for 1905 are: president, Mr. C. H. Peck; vice-president, Professor F. S. Earle; secretary, Mr. C. L. Shear.

Nature Study, published at Manchester, New Hampshire, was discontinued with the number for July, 1904. *The Nature-Study Review*, a bimonthly, with Professor M. A. Bigelow of the Teachers College, Columbia University, as managing editor, has begun its first volume with the issue for January, 1905.

In the discussion of "The Mutation Theory of Organic Evolution" before the American Society of Naturalists at Philadelphia, December 28, botany was represented by Dr. D. T. MacDougal of the New York Botanical Garden, who spoke from the standpoint of "Plant Breeding," and by Professor Liberty H.

Bailey of Cornell University, who spoke from the standpoint of "Taxonomy."

The Sullivant Moss Chapter met at the Academy of Natural Sciences, Philadelphia, December 31, 1904. There was an exhibit of specimens and photographs, and five papers were read. The officers for 1905 are: president, Mr. Edward B. Chamberlain; vice-president, Mrs. Carolyn W. Harris; secretary, Miss Mary F. Miller; treasurer, Mrs. Annie Morrill Smith.

According to a San Francisco letter in the *New York Times* of January 1, the Carnegie Institution has awarded to Mr. Luther Burbank, of Santa Rosa, California, a grant of $10,000, with prospect of annual renewal for a period of ten years, in order to further his experiments in plant breeding. We learn from *Science* that Mr. Burbank has been appointed a special lecturer in Stanford University.

At the meeting held in Philadelphia, December 27–31, 1904, the Botanical Society of America, the Society for Plant Morphology and Physiology, and the American Mycological Society approved a preliminary plan for a proposed merger of these three societies under the name of the Botanical Society of America. The details of the constitution of the new society are to be formulated by a joint committee during the coming year.

The eighth meeting of the Society for Plant Morphology and Physiology was held at the University of Pennsylvania, December 28–30, 1904. Seventeen papers were read. The address of the retiring president, Dr. George T. Moore, was upon "Applied Botany and its Dependence upon Scientific Research." The following officers were elected for the ensuing year: President, Professor E. C. Jeffrey; vice-president, Dr. C. O. Townsend; secretary-treasurer, Professor W. F. Ganong. Professor W. G. Farlow was chosen delegate to the International Botanical Congress at Vienna.

The Wild Flower Preservation Society of America held a meeting in Biological Hall, University of Pennsylvania, December 30, 1904. The destructive effects of forest fires formed the chief topic discussed. Reports of officers were read. Reso-

lutions deploring the havoc caused by fires and offering the co-operation of the society in efforts to lessen this evil were adopted for presentation to the American Forest Congress, called to meet in Washington, D. C., January 2–6, 1905. Officers for the ensuing year are: President, Professor C. E. Bessey; vice-president, Mr. Joseph Crawford; secretary, Mrs. N. L. Britton; treasurer, Dr. C. E. Waters.

The American Association for the Advancement of Science held its fifty-fourth annual meeting at the University of Pennsylvania, Philadelphia, December 27–31, 1904, under the presidency of Professor W. G. Farlow. Papers represented by 37 titles were offered before Section G (botany), including several by title only. Dr. B. L. Robinson occupied the chair. The vice-presidential address of Professor Thomas H. Macbride, retiring chairman of Section G, was upon "The Alamogordo Desert," and was illustrated by numerous lantern photographs. For 1905, Dr. Erwin F. Smith was elected chairman of Section G, Professor F. E. Lloyd continuing to serve as secretary. Professor C. R. Barnes, Mr. C. L. Shear and Dr. H. C. Cowles were appointed delegates to the International Botanical Congress to be held in Vienna in June, 1905.

The Botanical Society of America held its eleventh annual meeting at the University of Pennsylvania December 27–30, 1904, under the presidency of Mr. Frederick V. Coville. The address of the past-president, Professor C. R. Barnes, was entitled "The Theory of Respiration." In addition to the address, twenty-one papers were presented. Officers were elected as follows: President, Professor R. A. Harper; vice-president, Professor E. A. Burt; treasurer, Dr. Arthur Hollick; secretary, Dr. D. T. MacDougal; councillors, Professor L. M. Underwood and Professor William Trelease. Grants of $200 to Professor G. F. Atkinson to aid investigations on the fungi, and of $75 to Mr. Frederick V. Coville to facilitate work on the relation of plants to moisture were approved. Professor J. C. Arthur was chosen to represent the Society at the International Botanical Congress in Vienna.

Botanical visitors in New York since July 1, not already noted in TORREYA include Mr. O. W. Barrett, Agricultural Experiment Station, Mayagüez, Porto Rico; Professor Douglas H. Campbell, Stanford University, California; Dr. E. H. Eames, Bridgeport, Conn; Professor Vladislaw Rothert, Odessa, Russia; Professor B. M. Duggar, University of Missouri, Columbia, Mo.; Mrs. Flora W. Patterson, Mr. W. F. Wight, Mr. William R. Maxon, Mr. C. E. Waters, Mr. Jesse B. Norton, and Mr. E. L. Morris, Washington, D. C.; Dr. Margaret C. Ferguson, Wellesley College, Wellesley, Mass.; Dr. George H. Shull, Station for Experimental Evolution, Cold Spring Harbor, N. Y., Mr. Alfred Rehder, Jamaica Plain, Mass.; Dr. C. F. Millspaugh, Field Columbian Museum, Chicago; Mr. John F. Cowell, Director of the Botanic Garden, Buffalo, N. Y.; Professor Alexander W. Evans and Professor Arthur H. Graves, Yale University, New Haven, Conn.; Mr. Charles Louis Pollard, Springfield, Mass.; Mr. N. Ohno, Tōkyō, Japan; Professors F. S. Earle, and Mel. T. Cook, Estación Central Agronómica de Cuba, Santiago de las Vegas, Cuba; Professor J. E. Kirkwood, Syracuse University, Syracuse, N. Y.; Mr. John Macoun, Ottawa, Canada; Professor L. H. Pammel, Ames, Iowa; Dr. W. A. Cannon, Desert Botanical Laboratory, Tucson, Arizona. and Professor P. H. Rolfs, Miami, Florida.

Vol. 5 No. 2

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GALTONIAN REGRESSION IN THE "PURE LINE"*

By George Harrison Shull

Among the experiments undertaken this year at the Station for Experimental Evolution for the purpose of investigating the inheritance of characters in plants, was one intended to be essentially a repetition of Johannsen's studies† in the inheritance of seed-weights in beans. The variety of *Phaseolus vulgaris* chosen for this study proved to be unsatisfactory from a technical standpoint and it is not proposed to pursue the experiment further with this material, though several subsidiary questions may be taken up in other plants. The relation between the results of Johannsen on beans and those of Galton on sweet-peas‡ have appeared on further analysis to be in need of reinterpretation rather than reinvestigation, and the writer feels justified, therefore, in taking this abandoned experiment as a text for such reinterpretation.

From a number of statistical studies upon various characters in man and animals and a single series of experiments in sweet-peas, Galton derived his law of natural inheritance and its corollary — the law of regression from mediocrity.‖ The law of natural inheritance is, briefly, that the offspring of any

* Presented before Section G, A. A. A. S., at Philadelphia, December 30, 1904, under title of "Inheritance in Pure Lines."

†Ueber Erblichkeit in Populationen und in reinen Linien. Jena: Fischer, 1903.

‡ Natural inheritance. New York: Macmillan & Co., 1889.

‖ This has frequently been called "regression *toward* mediocrity," but as the coefficient of regression is measured *from* the mean condition of the population confusion has arisen through expressing it in this way. Galton's own inconsistency in discussions of regression is doubtless responsible for this confusion. He first presents it clearly as a deviation *from* mediocrity, but later says there is "no regression at all" when this deviation is equal in the two kinships under comparison, and the coefficient of regression is unity. *Cf.* Natural inheritance 95–98 with 132–133.)

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parentage, when considered in its entirety, inherits one-half its characteristics from its parents, one-fourth from its grandparents, one-eighth from its great-grandparents and so on. The law of regression from mediocrity points out that the children of extreme parents are not on the average so extreme as their parents, though they deviate in the same direction from the mediocre condition of the race. As an example of regression, take Galton's results on sweet-peas: The diameter of parent seeds which produced plants having on the average seeds of the same diameter was 3.94 mm. Assuming this to be the mediocre condition of the strain he was using he found that whatever the parental deviation from this diameter the mean filial deviation was in the same direction, but only one-third as great. Thus the offspring from seeds 5.34 mm. in diameter produced seeds having an average diameter of $3.94 + \frac{5.34 - 3.94}{3} = 4.41$ mm. (observed diameter, 4.44 mm.).

Johannsen obtained similar results in beans when he compared the average weight of seeds in the offspring with the weight of the parent seeds, if the latter were selected solely with reference to the weight of the individual seeds and without regard to the pre-parental ancestry; but when he separated the individual "pure lines" he found that the mean weight of seeds in the offspring is the same on the average as that of the preceding generations in the same "line," in other words, plants produced from small seeds bear seeds of the same average weight as do plants which are produced from large seeds having the same ancestry.

By the "pure line" Johannsen means a series of individuals related only through the process of self-fertilization. On *a priori* grounds it seems proper to apply the term to every series of individuals that do not combine the elements of two or more ancestral lines through the equivalent of a sexual process. Thus, so far as hereditary qualities are concerned, there should be no reason to expect in a self-fertilizing population, conditions different from those in a population related through budding or other method of vegetative reproduction, provided of course, that the self-fertilizing population has not been so re-

cently modified by a cross as to allow the analysis and recombination of characters derived from different ancestral lines.

The complete return of the offspring of an extreme parent, to the mean condition of the "pure line" to which it belongs, or in technical language the entire want of "regression" in the "pure line," is presented by Johannsen as a fundamental exception to the conclusions of Galton.

Weldon and Pearson have criticized * the work of Johannsen in considerable detail and although the tone of their criticism is adverse throughout, they grant that his main contention may well be true, that small seeds and large seeds of the same plant do not give rise to plants bearing small seeds and large seeds respectively. If read aright, their criticism must be held to be confirmatory in so far as Johannsen's data are capable of biometric analysis. Certainly their conclusion that his results are closely identical with those found for other plants and for animals when we compare *mean* parental and *mean* filial characters, agrees precisely with that reached by Johannsen, for these *means* represent the condition in the *population* or mixture of several "pure lines," and not in the individual "*pure line*."

The relation between this work of Johannsen and that of Galton on sweet-peas may now be considered. In the first place, the actual results were the same when the treatment of the material was the same, and in so far the work of Galton was confirmed; but when the "pure lines" were followed separately they were found to offer an apparent exception in the complete return of the offspring of extreme parents to the mean condition of the "pure line." Instead of this being fundamentally opposed to Galton's results, however, it is the condition which should have been derived *a priori* from Galton's "Law of natural inheritance."

Regression is lucidly explained by Galton † as due to the fact that the child inherits partly from his parents, partly from his more remote ancestry, and that if "traced far backwards his ancestry will be found to consist of such varied elements that they are indistinguishable from a sample taken at haphazard from the

* Inheritance in *Phaseolus vulgaris*. Biometrika, 2 : 499–503. N 1903.

† Natural inheritance, 105.

general population, . . . in other words it will be mediocre." Now, if the mean condition of the parental generation and of each preceding generation in the same line deviates to the same degree from the mean condition of the population, it becomes an inevitable inference that in so far as hereditary influences are concerned, the offspring must have the same mean character regardless of the largeness or smallness of the individual seeds from which those offspring have developed.

This "fixity of type" which Johannsen finds in the "pure line" was recognized by Galton in his treatment of pure breeds* and it seems strange that he did not perceive that his sweet-peas which he recognized and described as a self-fertilizing population were at variance with this fixity of type in the pure breed. Johannsen has brought harmony in Galton's results where there was a previously unnoted discord, and has confirmed the laws of "natural inheritance" and of "regression from mediocrity" as applied to the characters of self-fertilizing populations.

An important point which is brought out by these results of Johannsen both from a scientific and an economic standpoint is that the weight or size of an individual seed is not the hereditary unit, but the character of all the seeds of each plant considered as a whole. A plant which produces small seeds in general, may produce some seeds which are larger than the smallest seeds of another plant which produces large seeds in general, so that when the student of heredity wishes to use seed-characters or presumably any other repeated character, he must seek the general condition of the character in question in each plant and not depend upon the character of single seeds or single other repeated organs.

The economic application of this important principle is obvious. It has been very generally maintained by horticulturists that varieties deteriorate as the result of the selection of small seeds, tubers, etc., for propagation, but this proposition, while satisfying a certain sense of logic, has rested on no scientific research. The fixity of type in the "pure line" which now appears to be established, shows that no such deteriorating effect

* Natural inheritance, 189.

will be produced so long as the seeds are large enough to produce vigorous plants.

The farmer and the plant-breeder may plant the small potato tubers or the small seeds without any danger of deterioration in the yield and quality of the crop provided they select these tubers or seeds from plants which yield the largest quantity and the finest quality of tubers or of seeds.

Station for Experimental Evolution,
Cold Spring Harbor, Long Island.

SOIL WATER IN RELATION TO TRANSPIRATION

By V. M. Spalding

In a recent article by the writer on the creosote bush in its relation to water supply,* the statement was made that the amount transpired appears to stand in direct relation to the amount of water available in the soil in which the plant is growing. Further observations on this and some other desert plants not only confirm this view but go to show that water in the soil is a controlling factor, and that even as efficient an agent as light may, in comparison, take quite secondary rank.

The later literature of transpiration, however voluminous in general, is extremely limited as regards this branch of the subject.† Aloi and Ferruzza have shown that the amount of water in the soil is a factor by which the opening of stomata, and consequently the rate of transpiration, is controlled, and Stenström has attempted to formulate a mathematical equivalency between the rate of transpiration and the ratio of atmospheric and soil moisture. The remaining literature dates from the works of Sachs and older writers.

In the summer of 1904, while engaged in observing the influence of light of different degrees of intensity on transpiration, I found that results apparently conflicting became consistent when account was taken of the amount of water supplied to the plants under investigation and the time at which it was given.

* Botanical Gazette, 38: 122. 1904.

† Burgerstein, A. Die Transpiration der Pflanzen, 137. 1904.

The plants employed were seedlings of the creosote bush (*Covillea*) and palo verde (*Parkinsonia Torreyana* and *P. aculeata*) growing in cans and supplied with measured quantities of water at stated intervals. The rate of transpiration was determined by placing the plants under a bell-jar, with suitable precautions to prevent the absorption or escape of water vapor, the amount of water transpired being derived from readings of a hygrometer. As details will be given elsewhere, a brief résumé of experiments and results will be sufficient for the present purpose.

Beginning with the palo verde, two sets of plants, one serving as a check on the other, were used. August 11, the plants having been well watered the day before, the rate of transpiration was determined. The following day, August 12, the plants meantime having received no water, but having been treated precisely as before, as regards light and other controllable conditions, the rate of transpiration was found to be only 52.6 and 38.5 per cent. as high as it was on the preceding day, a result apparently attributable to nothing else than the diminished quantity of water in the soil in which the plants were growing.

The same plants were again placed under observation August 18, having been given no water since August 15. External conditions were favorable to transpiration, full sunlight, a fresh breeze, and rather high temperature. At 11:40 A. M., after the rate of transpiration had been noted, number 1 was given one ounce, and number 2 three ounces of water. At 1:15 P. M., the rate of transpiration of number 1 was found to be the same as at the time of the preceding observation, while that of number 2 was twice as great. At 4 P. M., observations were again made, and at this second afternoon reading it was found that number 1 was transpiring twice and number 2 four times as rapidly as at the time of the forenoon observation.

The following forenoon the rate of transpiration of number 2 was found to be nearly four times as great as that of number 1, a striking difference when it is considered that only twenty-four hours earlier their rate had been the same, explainable, it would seem, only by recalling the fact that when the observations began on the morning of August 18, both sets of plants were in dry

soil, but on the following day number 2 had received three times as much water as number 1, and probably on account of sub irrigation was able to utilize a greater percentage of what was given to it.

Experiments with *Covillea* gave even more striking results. September 5, the transpiration of two plants, designated 1 and 2, was determined in the forenoon between 11 and 12, and again in the afternoon between 3 and 4 o'clock. Number 2 was given three ounces of water at 12:20, none being given to number 1. At the time of the afternoon observation it was found that number 2 was transpiring more than three times as rapidly as it was before the water was given to it, and number 1, which was not watered, was transpiring only one-fifth as rapidly as it was in the forenoon.

Observations were also made for the purpose of ascertaining the effect of exposure to direct sunlight in conjunction with water supply. It was found that exposure to bright sunlight was uniformly followed by accelerated transpiration, whenever the plant under observation had a full supply of water, but that otherwise such acceleration did not take place.

It is noteworthy that plants which had all along received a meagre supply of water were nevertheless in a position to transpire rapidly when once a full supply of water was furnished them, while plants which from the beginning had received a very large amount of water showed promptly a marked lowering in rate of transpiration when the water supply was reduced.

With so complicated a problem general statements may well be made with extreme caution, but the evidence in the present case is sufficient to show that in studies of transpiration it is altogether unsafe to attempt to estimate any other factors whatever without taking due account of water in the soil.

Desert Botanical Laboratory of the Carnegie Institution,
Tucson, Arizona.

A KEY TO THE STIPITATE POLYPORACEAE OF TEMPERATE NORTH AMERICA — I

By William A. Murrill

Key to the Genera

Surface of hymenophore covered with reddish-brown varnish. **A.** Ganoderma
Surface of hymenophore not as above.
  Tubes hexagonal and radially elongated. **B.** Hexagona
  Tubes not as above.
    Stipe compound. **C.** Grifola
    Stipe simple.
      Context white.
        Plants fleshy, terrestrial. **D.** Scutiger
        Plants tough, epixylous.
          Pileus inverted, erumpent from lenticels. **E.** Porodiscus
          Pileus erect, not erumpent.
            Context homogeneous, firm. **F.** Polyporus
            Context duplex, spongy above, woody below. **G.** Abortiporus
      Context brown.
        Hymenium concentrically lamelloid. **H.** Cycloporus
        Hymenium poroid.
          Spores white. **I.** Romellia
          Spores brown.
            Pileus erect, stipe central. **J.** Coltricia
            Pileus inverted, pendent. **K.** Coltriciella

A. The Stipitate Species of Ganoderma

1. Context ochraceous to fulvous; plant perennial on deciduous trees. *G. flabelliforme* (Scop.) Murrill
   Context pallid; plant annual on hemlock. *G. Tsugae* Murrill

B. The Stipitate Species of Hexagona

1. Surface glabrous to fibrillose, not distinctly hispid. 2
   Surface hispid; tubes small; context thin, translucent. *H. floridana* Murrill
2. Pileus reniform at maturity; stipe usually much reduced. 3
   Pileus flabelliform; stipe usually very distinct, equaling the pileus at times in length; tubes of medium size. *H. daedalea* (Link) Murrill
3. Tubes large; surface of pileus decorated with imbricated reddish-brown fibrils, which disappear with age. *H. alveolaris* (DC.) Murrill
   Tubes much smaller, the mouths rarely over 1 mm. long and 0.5 mm. broad; surface of pileus glabrous. *H. micropora* Murril

C. The Species of Grifola

1. Hymenium ochraceous, becoming dirty-yellow with age; plants terrestrial, irregularly confluent, olivaceous to greenish-yellow. *G. poripes* (Fr.) Murrill

   Hymenium white or pallid, sometimes becoming fuliginous, but never ochraceous. 2

2. Surface of pileus gray or grayish-brown to coffee-colored; stipe intricately branched; lobes numerous and small. 3

   Surface of pileus pallid or alutaceous; stipe not intricately branched; lobes usually few in number and comparatively large. 5

3. Pileoli centrally attached, circular and umbilicate. *G. ramosissima* (Scop.) Murrill

   Pileoli lateral, spatulate or dimidiate. 4

4. Hymenium white, not changing color; surface of pileus gray or grayish-brown. *G. frondosa* (Dicks.) S. F. Gray

   Hymenium white, becoming fuliginous on drying or when bruised; surface of pileus coffee-colored. *G. Sumstinei* Murrill

5. Sporophore of immense size, 20–60 cm. in diameter; spores echinulate, 8–9 μ. *G. Berkeleyi* (Fr.) Murrill

   Sporophore 8 cm. or less in diameter; spores smooth, ovoid, much smaller. *G. fractipes* (B. & C.) Murrill

D. The Species of Scutiger

1. Surface of pileus uneven, squamose or rugose. 2

   Surface of pileus smooth, tomentose or glabrous. 4

2. Pileus sulfur-yellow, pleuropous; surface ornamented with imbricated floccose wart-like scales; context white or yellowish; tubes small, angular, decurrent, white, becoming greenish when wounded, yellowish when dry; spores $9\times6\,\mu$. *S. Ellisii* (Berk.) Murrill

   Pileus brown. 3

3. Tubes large, 1.5 mm. or more in diameter, hexagonal; surface of pileus smoky-brown ornamented with darker imbricated tufts of appressed hairs; context white; stipe excentric, its entire surface reticulate. *S. retipes* (Underw.) Murrill

   Tubes small, 0.5 mm. in diameter, polygonal, decurrent, white; pileus reddish-brown, rugose; stipe central, not reticulate. *S. decurrens* (Underw.) Murrill

4. Pileus light-colored: white, yellow or blue. 5

   Pileus dark-colored: gray or brown. 7

5. Pileus white; context white; tubes irregular, dissepiments thin, white; plants small, growing upon grass-roots; stipe short, dark-brown. *S. cryptopus* (Ell. & Barth.) Murrill

   Pileus yellow to orange, glabrous; stipe short, concolorous; tubes short, small, 1–2 $\times$ 0.2 mm., decurrent; spores ovoid, hyaline, 4×5–$6\,\mu$. *S. laeticolor* Murrill

   Pileus blue when fresh, changing to brown on drying. 6

6. Tubes entire, becoming reddish-brown on drying; context ochraceous, and pileus and stipe reddish-brown in herbarium specimens. *S. caeruleoporus* (Peck) Murrill

Tubes lacerate, fading to grayish-brown or dirty white; context nearly white; pileus and stipe dull smoky-brown when dry. *S. holocyaneus* (Atk.) Murrill

7. Stipe black and rooting. 8
   Stipe neither black nor rooting. 9
8. Pileus smoky-brown, subtomentose; margin thin, inflexed; context white; tubes regular, polygonal, entire, 2 mm. long, 0.5 mm. in diameter; stipe cylindrical, light-brown above, black and rooting below; spores white, elliptical, $7 \times 5\,\mu$. *S. radicatus* (Schw.) Murrill
   Pileus drab-colored, nearly glabrous; margin thin, inflexed when young; context milk-white even when dry; tubes white, irregular, toothed, 1 mm. long, 0.25 mm. in diameter; stipe short, sooty-black as far as the decurrent tubes, attached to buried wood; spores white, $3\text{–}4 \times 5\text{–}7\,\mu$. *S. subradicatus* Murrill
9. Pileus gray, glabrous or nearly so; margin very thin; context rosy-gray, soft, fleshy, thin when dry; tubes small, 0.25–0.5 mm., unequal, decurrent; stipe short, concolorous. *S. griseus* (Peck) Murrill
   Pileus brown. 10
10. Stipe dark-purple, very thick; pileus fulvous-brown, purplish at times, clothed with short tomentum, margin very obtuse; context reddish beneath the cuticle, marked when dry with a black concentric line limiting growth; tubes white, 2 to a mm. *S. persicinus* (B. & C.) Murrill
    Stipe yellowish-brown, usually excentric; plants cespitose; pileus yellowish-brown, pruinose; margin thin; context rose-tinted when dry, dark-red next to the tubes, which are small, $1\text{–}3 \times 0.3$ mm., decurrent, rose-colored when dry, the edges fimbriate. *S. Whiteae* Murrill

A PALM FROM THE MID-CRETACEOUS *

By Edward W. Berry

The enormous number of existing palms, considerably over one thousand species, are about equally divided between the oriental and occidental tropics, with many monotypic genera, showing well the marked effects of geographical distribution and isolation on the formation of species. There are no outlying forms, the highest northern latitude reached being about 43° in Europe, and the highest southern latitude about 45° in New Zealand.

Lesquereux writing in 1878† records fossil palms in 52° north latitude in both America and Europe. Since then remains have been described from as far north as 80° (Grinnell Land, Spitzbergen), and two fine species are recorded from the Tertiary

* Published by permission of the Maryland Geological Survey.

† Tertiary Flora.

of Greenland (latitude 70°). A variety of Paleozoic remains have been referred to the Palmae, ranging from Stigmaria trunks to Cordaitean leaves and fruits; the nature of the latter having been first rightly conjectured by Brongniart in 1828*. With the marvellous increase, during the last twenty-five years, of our knowledge of the vegetation of the Paleozoic, we can now positively affirm that palms are unknown from pre-Mesozoic formations.

Stenzel, who has recently monographed† the fossil palm-wood of the world, finds the oldest known wood to come from the Turanian of France (1 species); the succeeding formation, the Senonian, has yielded him six species; and, with the ushering in of the Tertiary, the species become numerous.

Undoubted remains of palm-leaves occur somewhat earlier, and the Mid-Cretaceous, in the light of our present knowledge, marks the introduction of this type.

The Cenomanian of Europe has furnished undoubted palm-leaves, and Stur‡ has described fruit from that formation in Bohemia, and Fliche from the same horizon in France. The next formation, the Senonian, shows species in a variety of genera (*Nipadites*, *Flabellaria*, etc.). It is in the Tertiary, however, that palms become greatly developed and widespread, and the numerous species founded on stems, leaves, petioles, fruits, and even flowers, are referable to a large number of genera (*Geonoma*, *Manicaria*, *Phoenix*, *Nipa*, *Chamaerops*, *Orcodoxites*, *Sabal*, *Iriartea*, *Latanites*, etc.). In this country the earliest known remains are those small fragments of striated leaves, of a rather doubtful nature, which Lesquereux described§ as *Flabellaria minima* from the Dakota group (Cenomanian).‖

The Montana group, of Senonian or possibly Danian age, has furnished Knowlton¶ with the undoubted remains of a large

* Prodrome Hist. Végét. Foss.

† Beitr. Palaeont. u. Geol. Oesterr. Ungarn. 1–182. *pl. 1–22.* 1904. [Folio.] (I am indebted to Dr. F. H. Knowlton for an abstract of this work.)

‡ Verhandl. k. k. Geol. Reichsanstalt. Wien. 1873.

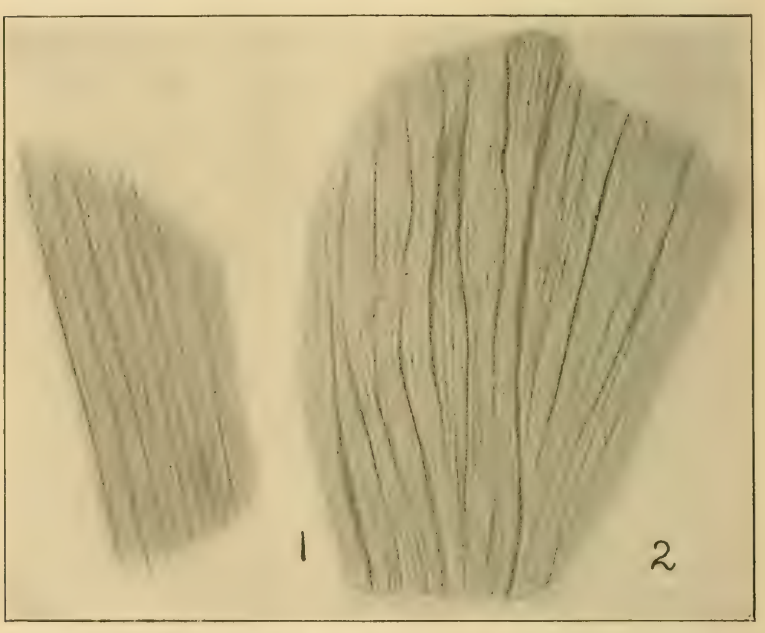
§ Cret. Flora, 56. *pl. 30. f. 12.* 1874.

‖ It is now definitely decided that Hollick's supposed palm, *Seven pal*, from the Raritan of Long Island, is a *Nelumbo*.

¶ Bull. U. S. Geol. Surv. 163: 32. 1900.

palmetto-like form (*Sabalites*)*, while the Laramie (Danian) furnishes a number of species, some of which, represented by both leaves and fruit, continue through the Eocene and help to make up the abundant palm flora of the early Tertiary in this country.

The characters of fragments of leaves or rays are rarely definite enough for specific or even generic diagnosis, and usage has sanctioned their reference, in cases of doubt, to the genus *Flabellaria* of Sternberg, which, while including some anomalies,



is properly used for those large flabellate leaves, which from the nature of the remains it is impossible to refer positively to *Sabal* (*Sabalites*), *Geonomites*, etc., as is the case with the specimens before me.

Flabellaria magothiensis sp. nov., *figs. 1 & 2.*—Fragmentary remains of large, palmetto-like leaves of considerable consistency; some specimens showing long parallel corrugations, the finer structure being destroyed (*fig. 2*); others finely veined with somewhat heavier veins 2 to 4 mm. apart (*fig. 1*).

* Dawson has also described a *Sabal* from the upper Cretaceous of Nanaimo.

Collected by Bibbins & Berry at Grove Point, Maryland, and Deep Cut, Delaware.

The remains are most numerous at the former locality, where many specimens were collected, the largest 8 cm. square.

They occur in thin layers of clay intercalated between thicker layers of white sand, and from the nature of the deposit and the awkward point of outcrop (beneath an overhanging bluff of clay) it is impossible to get out anything like complete material.

I have no doubt that with the expenditure of much time and labor, better specimens could be secured, and would have deferred publication were it not for the interest attached to so early a species of palm, and I have no doubt that it is a palm, whatever its generic affinities may subsequently be found to be. It is certainly much more positive material than Lesquereux's from the Dakota group, and the figures but poorly depict the specimens which are particularly difficult to represent. Both of the outcrops where these remains occur are in the upper part of what Darton* called the Magothy formation, and which Ward† and others would include in the Raritan. Dr. Wm. B. Clark has recently‡ suggested that they may be correlated with the exposure at Cliffwood, N. J., thus forming transition beds between the Albian and the Cenomanian. The flora of Cliffwood has certainly a Cenomanian facies, and it remains for an exhaustive study of the flora of the Magothy to determine positively its exact age according to European standards.

Passaic, N. J.

SHORTER NOTES

Galactia Curtissii sp. nov. — A shrub, 6 dm. high or less, widely branched, densely tomentulose all over, the branches terete. Leaves 3-foliolate; stipules subulate, 2–3 mm. long; petiole stout, 2 cm. long or less; leaflets oblong, oblong-lanceolate or oblong-oblanceolate, broadest at about the middle, thick, light-green, obtuse at both ends, or subcordate at the base, finely and strongly reticulate-veined beneath, 3–6 cm. long, 2 cm. wide or less, the

* Darton, Am. Jour. Sci. III. 45: 407–419. 1893.

† Ward, Am. Rep. U. S. Geol. Surv. 8²: 871. 1889; *ibid.* 15: 372. 1895.

‡ Clark, Am. Jour. Sci. IV. 18: 435–440. 1904.

lateral ones short-stalked, the terminal one 8–12 mm. long: spikes shorter than the leaves, simple or compound, interrupted, several- to many-flowered: calyx campanulate, about 7 mm. long, its teeth triangular-lanceolate, acute, tomentose, the longer ones nearly twice as long as the tube: corolla purple; standard nearly orbicular, short-clawed, about 8 mm. in diameter, about as long as the longer-clawed wing-petals: legume linear, brown-tomentulose, 4–4.5 cm. long, 5 mm. wide: seeds dull, obliquely oval, 3 mm. long.

Nueva Gerona, Isle of Pines, Cuba, *A. H. Curtiss*, 1904, *no. 402*.

Related to the Mexican *Galactia multiflora* Robinson.

N. L. Britton.

Panaeolus acidus sp. nov. — Pileus 1–3 cm. across, convex then expanded almost plane, smooth, slightly fleshy at the disk, very thin at the margin, brown with yellow tinge; gills adnate, 2–3 mm. broad, black with white edge; stem 8–10 cm. high, slender, hollow, equal, concolorous, 2–3 mm. thick; spores black, broadly ovate, pointed at each end.

Growing in a cluster on the bottom of a box in a cellar. The box contained a large bottle of acetic acid which had been broken and the contents emptied on the bottom of the box. The plant grew on this saturated wood.

In drying the color of the pileus became darker and the edges reflexed. In general appearance it resembles *Psilocybe foeniseeii* (Pers.) Fr., but the black spores readily distinguish it from that species.

Type specimens are in the Carnegie Museum, Pittsburg, Pa.

D. R. Sumstine.

Kittanning, Pa.

PROCEEDINGS OF THE CLUB

Tuesday, December 13, 1904

The meeting was held at the College of Pharmacy, Dr. H. H. Rusby in the chair, eleven members present.

Resignations were accepted from Miss Hannah S. Wingate and Mrs. Emily H. Terry, and from Messrs. Samuel Sloan, R. H. Lawrence and F. W. Kobbé.

The following were elected to membership: Miss Alice A. Knox, Barnard College, New York City; Miss Amelia R. Goodlatte, Passaic, N. J.; Miss Lenda T. Hanks, Girls' Technical High School, New York City; Miss Mary F. Barrett, 19 Elm Street, Bloomfield, N. J.; Mr. LeRoy Abrams, N. Y. Botanical Garden.

The first paper on the program was by Professor F. E. Lloyd, who spoke of the Desert Botanical Laboratory at Tucson, Arizona. He pointed out that there were four characteristic types of desert visible with great regularity from the car window westward from El Paso, as the train passed from mesa to hill country or *vice versa*. The character-plants of these four deserts, which are remarkably distinct and pure, are *Yucca*, *Ephedra*, mesquite, *Parkinsonia* and *Fouquieria*, in abundance. Professor Lloyd spoke in some detail of the vegetation in the vicinity of Tucson, illustrating his remarks with numerous excellent photographs, including several good pictures of *Cereus giganteus* in bloom and in fruit.

It was remarked that the plants with motile leaves, such as *Cassia*, *Acacia* and *Parkinsonia*, all faced the sun at sunrise, but did not follow its course during the day. *Fouquieria* was described in detail, attention being called to its short-lived primary leaves and curious spines which were cited as an example of direct metamorphosis, the rosettes of secondary leaves appearing in the axils of the latter. The primary object of Professor Lloyd's stay at the laboratory was the determination of the relation between stomatal action and transpiration. Numerous experiments were made, the results of which are to be reported in detail later.

The second paper, by Mr. George V. Nash, was on the vegetation of Inagua. Mr. Nash recently spent four weeks in collecting there. Inagua includes a large and a small island located some sixty miles northeast of Cuba, and with a total area of between five and six hundred square miles of mostly low land, the highest point reaching only 132 feet above the sea.

The flora is poor, embracing some 350 or 400 species, the relatively numerous cacti in the genera *Opuntia*, *Cactus*, *Melocactus*, and *Pilocereus* emphasizing the desert-like conditions pre-

vailing on the islands. Five plant areas were differentiated: — (1) that of the Strand; (2) the Scrub, where nearly all the endemic species of the islands have been found; (3) the White Sand or White Land as it is called locally, characterized by a species of *Coccothrinax;* (4) the Salinas, characterized by the shrub *Avicennia nitida* Jacq.; and (5) the Savannas, where *Conocarpus sericea* Forst. is the characteristic shrub and *Sporobolus virginicus* the common grass. In the numerous salt-holes is found the only fern of the islands, *Acrostichum aureum.*

Excellent photographs were exhibited showing the dwarfing effect of the sharp winds of the southern coast, where the vegetation, elsewhere six or eight feet tall, is reduced to a foot or two in height and becomes widely spreading.

One of the results of Mr. Nash's trip was the extension of the range of *Pseudophoenix Sargenti* about 350 miles to the southward; another the collection of a number of new species. Numerous photographs, and specimens from each of the plant areas, illustrated the speaker's various points.

Edward W. Berry,
Secretary.

NEWS ITEMS

Dr. and Mrs. N. L. Britton and Dr. Marshall A. Howe, of the New York Botanical Garden, and Dr. C. F. Millspaugh of the Field Columbian Museum, Chicago, are devoting several weeks to botanical explorations in the Bahamas.

The extensive botanical collections and library of Capt. John Donnell Smith, of Baltimore, have been presented by him to the Smithsonian Institution. All the old-world plants, and all of the American orchids, grasses, sedges and lower cryptogams, are already in Washington. The remainder of the American specimens, and all of the books, are to remain in Capt. Smith's possession as long as he may wish to retain them.

Vol. 5 No. 3

TORREYA

March, 1905

THE EARLY WRITERS ON FERNS AND THEIR COLLECTIONS — IV. PRESL, 1794–1852; JOHN SMITH, 1798–1888; FÉE, 1789–1874; AND MOORE, 1821–1887

BY L. M. UNDERWOOD

The real enlargement of the conception of fern genera commenced with Presl and continued with John Smith, Fée and Moore, who were the generic "splitters" in this group of plants. The form of the sporangium had early served to distinguish families, and genera were characterized by the varied distribution of the sporangia over the leaf-surface, combined with the shape of the indusium. Under this method of distinguishing genera Swartz had recognized 38 genera in 1806, and Willdenow 43 in 1810; Desvaux, more liberal, recognized 70 in 1827, and Sprengel the same year found only 66. These numbers were nearly up to the Hookerian standard, for in the *Synopsis Filicum* of 1874 only 76 genera were recognized for the orders Ophioglossales, Marattiales, and Filicales. Contrasted with these numbers, the above-named writers increased the number of fern genera as follows:

Presl,	232 genera.
John Smith,	220 genera.
Fée,	181 genera (Polypodiaceae, only).
Moore,	176 genera.

Karel Boriwog Presl (1794–1852), a native of Bohemia, commenced publication among the ferns in the *Deliciae Pragenses* (1822) and the *Reliquiae Haenkeanae* (1825*) in which he described numerous species from Brazil, Mexico, Peru, and the Philippines. Then followed his first publication on genera in his

*The date on the title page of the first volume is 1830, but the work was published in parts, the parts containing the ferns in 1825.

[Vol. 5, No. 2, of TORREYA, comprising pages 21–36, was issued February 28, 1905.]

Tentamen Pteridographiae (1836) in which he recognized 116 genera in the Polypodiaceae and Cyatheaceae. This was followed in 1843 by his *Hymenophyllaceae* and in 1845 by his *Supplementum Tentaminis Pteridographiae*, which treated the remaining families. In the former work many new species were described and the *Supplementum* was a monograph of the families Ophioglossaceae, Marattiaceae, Osmundaceae, and Schizaeaceae. His later works were *Die Gefässbündel im Stipes der Farrn* (1847) and *Epimeliae Botanicae* (1849), in which, besides describing many new species, he established 68 additional genera, bringing the total number recognized by him to 232. Presl was among the first to recognize the distribution of the fibro-vascular system both in the stem and in the leaf as having primary importance in the matter of relationship among ferns, and after Robert Brown, was the first really to look upon a genus of ferns as a natural group of closely allied organisms, instead of a loose assemblage of organisms whose superficial and accidental characters brought them under a cut and dried definition based on artificial resemblances.

Such unnatural and unholy alliances as the groups of species still included in *Gymnogramme*, *Acrostichum*, *Polypodium*, and *Davallia* in the *Synopsis Filicum* of Hooker and Baker, were separated by Presl into much more natural groups, and while he made errors, as might be expected in a pioneer, his system is in many respects the most logical single system that has yet appeared.

Presl's collection of ferns is in the botanical museum of the German University of Prague, although some of his types are at Vienna. The collection lies in its original sheets, dust-covered, unmounted, and unmolested. When we visited the collection in 1903 it was even impossible to consult any of Presl's voluminous writings on ferns in connection with his collection, for the simple reason that the extensive botanical laboratory in Prague did not possess them. With the single exception of a solitary note by Al. Braun there was little to show that any one else had ever consulted the collection since Presl's death, and yet the collection, next to those at Kew, Berlin, and Paris, is probably the most im-

portant, abounding in novelties and rich in the types of Presl, for he published no less than four hundred species of pteridophytes.

John Smith (1798–1888) was the curator of the Kew Gardens who built up the splendid collection of living ferns at that establishment. He knew ferns in cultivation better than any man before or since his time, and the genera he established were founded largely on habital characters which in great measure were dependent on the fibro-vascular system, whose importance in taxonomy he also clearly recognized. Besides publishing an enumeration of the ferns of the Philippines, Smith early published an outline of his system of fern classification in *Hooker's Journal of Botany* (4: 38–70; 147–198. 1842) and afterwards developed it in his later publications (1) *Cultivated Ferns* (1857), (2) *Ferns British and Foreign* (1866, 2d ed. 1877) and (3) *Historia Filicum* (1875), in which he also reviewed other systems.

Smith's collection is at the British Museum and is interesting as the work of a horticulturist, which like that of a pure morphologist shows underestimation of the value of a herbarium specimen. As Smith described comparatively few species, his collection contains few types.

Antoine Laurent Apollinaire Fée (1789–1874) was professor at Strasbourg so long as that city formed a part of France. His publications on ferns consist mainly (1) of eleven memoirs on ferns, the first four in folio monographing *Antrophyum*, *Vittaria*, and *Acrostichum;* the others are in quarto form and comprise *Genera Filicum* (Memoir 5), descriptions of new species from various parts of the world (memoirs 6, 7, 8, and 10), a list of ferns of Mexico (Memoir 9), and a similar but more pretentious list of the ferns and lycopods of the Antilles (Memoir 11); and (2) *Cryptogames vasculaires du Brésil* (1869), with *Supplement* (1872–73) similarly in quarto and like the memoirs admirably illustrated with lithographic plates. These two series contain a total of 285 quarto or folio plates and illustrate about eight hundred species of ferns.

Fée's collection of ferns once belonged to Dom Pedro II of Brazil, and after the death of that unfortunate monarch became the property of M. Cosson in Paris, in whose admirable herbarium

it is now incorporated. Fée's species are largely valid ones, but his work has been discredited by the Hookerian school mostly without having seen Fée's types. With Paris as near London as Washington is near New York, this condition of affairs is positively inexplicable, and absolutely without excuse.

Thomas Moore (1821–1887) commenced the publication of an admirable *Index Filicum* in 1857–63, which contained his fern system (pp. ix–clxii, *pl. 1–84*), and commenced an alphabetical enumeration of ferns and their synonyms (pp. 1–396). Publication unfortunately stopped in the middle of the letter G. The MSS. of the remainder is preserved at Kew with Moore's extensive herbarium, the latter containing a number of types of species published largely in the Gardeners' Chronicle. Many have asked, Why should this not be published now? There are many reasons, and among them either one of two should decide the question in the negative. (1) Over three thousand species of ferns have been published since Moore's publication ceased. It would therefore contain less than half of the known species of ferns and so would be notoriously incomplete. (2) In Moore's time the idea of type localities had not become so all-important in the matter of systematic study of ferns as it has at the present time. No index can be regarded adequate for modern use that does not give, in addition to its citation, the type locality, *i. e.*, the source from which the species was first described.

This brief series of papers would be incomplete did we not refer to one other distinguished fern student, Georg Heinrich Mettenius, (1823–1866) for many years professor at Leipzig. Besides various enumerations of the ferns of various countries like Colombia and New Caledonia, Mettenius published (1) his *Filices Horti Botanici Lipsiensis* (1856), in which he early outlined his rather conservative classification, as he recognized only 72 genera, and, (2) a series of monographs of various genera: *Phegopteris*, *Cheilanthes*, *Polypodium*, *Aspidium*, and *Asplenium*, in his *Ueber einige Farngattungen*. After the untimely death of Mettenius, Kuhn, another brilliant but short-lived German pteridologist, published the *Reliquiae Metteniauae* (Linnaea, 35: 385–394. 1868; 36: 41–169. 1869), in which some species were unfortunately published of

which only imperfect material is in existence, some indeed that Mettenius would certainly never have published on such meager data. Mettenius' collection is now incorporated with the general collection of ferns at Berlin, which is next to Kew the most extensive in the world.

Other centers of interesting fern collections in Europe are those of Copenhagen with Liebmann's Mexican species; Munich, with Martius' Brazilian series; Leipzig, with Kunze's collection; and lastly Madrid with the collection of Cavanilles. Before our fern system has been completed all these and the others discussed in this series of papers must be studied comparatively from the standpoint of type specimens.

OTHER FREAKS OF PEAS

By Ida Clendenin

In the November number of Torreya, Dr. A. J. Grout speaks of the "queer freaks" one comes across in our large city schools in handling the material used by the botany classes. I want to describe one of these that has recently come to my notice, though it may not be so unusual as the one described by Dr. Grout.

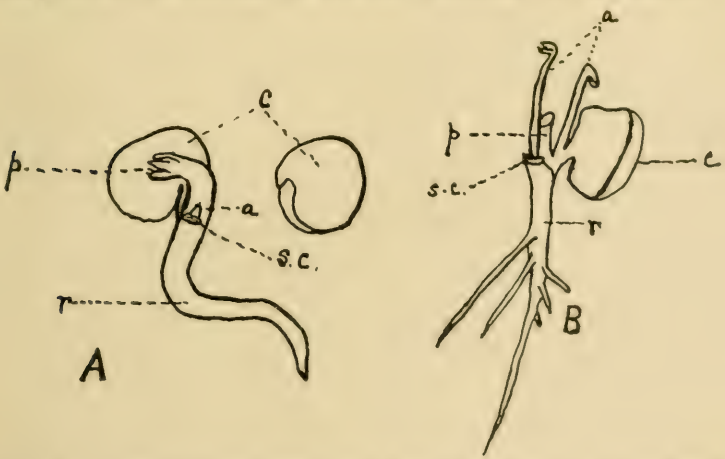


Fig. A. Young seedling, showing bud in axil of cotyledon. *a*, bud in axil of cotyledon; *c*, cotyledon; *p*, plumule; *r*, radicle; *s. c.*, scar of cotyledon.

Fig. B. Young seedling with plumule cut off; shoots from buds in axils of cotyledons.

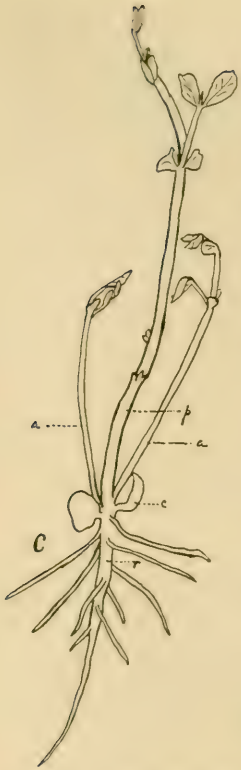


FIG. C. Seedling showing shoots from plumule and from bud in axil of each cotyledon.

In making an experiment last fall to find out the function of the cotyledons of the pea, by placing the radicles of very young seedlings in water, eight or ten girls in my botany classes reported that they had peas with three plumules. When they brought them to class, for inspection, I found that each of these seedlings had the ordinary shoot from the plumule and a shoot from the tiny bud in the axil of each cotyledon. These buds make their appearance at an early stage of germination, whether the peas are germinated in earth or on moist blotting paper, but among the thousands of seedling peas which I have dug up from the germinating boxes in the Girls' High School, I do not remember to have found one in which these buds had developed into shoots except in seedlings whose terminal bud (plumule) had been destroyed. In this emergency, the growth of one or both of these axillary buds is to be expected ; I have often induced it by pinching off the plumules of young seedlings growing with the radicles in water, and it is interesting to note that the shoots from these buds lift themselves in an arch, just as the shoot from the plumule does. So far as my own observations go, the development of shoots from buds in the axils of cotyledons in addition to the shoot from the plumule is rare, and it is difficult to explain why so many seedlings should have shown that tendency the past season.

GIRLS' HIGH SCHOOL, BROOKLYN,
December 27, 1904.

A KEY TO THE STIPITATE POLYPORACEAE OF TEMPERATE NORTH AMERICA—II*

By William A. Murrill

E. The Species of Porodiscus

Plant minute, abundant on twigs of chestnut, oak, etc.; stipe attached to the vertex of the pileus and usually curved at maturity.
P. pendulus (Schw.) Murrill

F. The Species of Polyporus

1. Stipe pallid or light-brown, not darker than the pileus. 2
   Stipe wholly or partly black or fuliginous, darker than the pileus. 9
2. Margin of pileus not ciliate. 3
   Margin of pileus ornamented with cilia, which often disappear with age; tubes alveolar. 7
3. Pileus trumpet-shaped, deeply infundibuliform. *P. craterellus* B. & C.
   Pileus not trumpet-shaped. 4
4. Surface tomentose, often becoming glabrous. 5
   Surface glabrous from the first. 6
5. Tubes decurrent, very short, entire; pileus dark-purple, with paler radiating lines; known only from Alabama. *P. dibaphus* B. & C.
   Tubes not decidedly decurrent, denticulate when mature; pileus yellowish to smoky-black; common throughout. *P. Polyporus* (Retz) Murrill
6. Context light-brown; tubes decurrent; known only from South Carolina.
   P. columbiensis Berk.
   Context golden-yellow; tubes remote; known only from Ohio.
   P. phaeoxanthus B. & Mont.
7. Pileus very thin, smooth, pellucid; known only from North Carolina.
   P. arculariellus Murrill
   Pileus opaque. 8
8. Pileus less than 1 cm. in diameter, light-gray; stipe setulose; known only from Tennessee. *P. arculariformis* Murrill
   Pileus considerably larger, brown in color; stipe squamulose; common throughout. *P. arcularius* (Batsch) Fr.
9. Pileus squamose, very large, flabelliform; tubes large, alveolar.
   P. caudicinus (Scop.) Murrill
   Pileus glabrous; tubes punctiform. 10
10. Stipe ivory-black below; pileus usually ochraceous, surface scarcely depressed, margin even, not becoming extremely thin. *P. elegans* (Bull.) Fr.
    Stipe smoky-black below; pileus usually chestnut-colored, depressed at the center or behind, margin usually very thin and irregular. *P. fissus* Berk.

G. The Species of Abortiporus

Plant rather common about stumps, usually much aborted and often only a mass of pores. *A. distortus* (Schw.) Murrill

* Continued from p. 30.

H. The Species of Cycloporus

Plant very rare, terrestrial, with central stipe and concentrically furrowed hymenium. *C. Greenei* (Berk.) Murrill

I. The Species of Romellia

Plant abundant, large, spongy, hispid, very destructive to conifers. *R. sistotremoides* (Alb. & Schw.) Murrill

J. The Species of Coltricia

1. Pileus concentrically zonate; context thin. 2
   Pileus azonate; context rather thick and spongy. 4
2. Pileus shining cinnamon, strigose, striate, thin, flexible, slightly depressed, the margin often fimbriate or pseudo-ciliate. *C. cinnamomea* (Jacq.) Murrill
   Pileus dull rusty cinnamon to hoary, velvety to glabrous, deeply depressed, the margin thicker and less fimbriate. 3
3. Tubes small, 0.5 mm. or less in diameter. *C. perennis* (L.) Murrill
   Tubes large, 1 mm. in diameter. *C. parvula* (Kl.) Murrill
4. Context homogeneous; hymenium free from spines. 5
   Context duplex, soft above and woody below; hymenium beset with spines. *C. tomentosa* (Fr.) Murrill
5. Pileus ferruginous to fulvous, 5 cm. in diameter, surface finely tomentose; stipe swollen and soft at the base. *C. obesa* (Ell. & Ever.) Murrill
   Pileus darker, fulvous to chocolate-colored, 10 cm. in diameter, surface rough and shaggy; stipe scutate and firm at the base. *C. Memmingeri* Murrill

K. The Species of Coltriciella

Plant minute, pendant, very rare, on decayed pine wood. *C. dependens* (B. & C.) Murrill

New York Botanical Garden.

SHORTER NOTES

Jacquinia Curtissii sp. nov. — A low shrub. Leaves linear-lanceolate, 2–3 cm. long, 3–4 mm. wide, attenuate into a mucro 2–3 mm. long, glabrous, the rigid margins revolute; twigs puberulent; inflorescence involucred by minute scales, 3- or 4-flowered; peduncle 3–4 mm. long, less than half as long as the slender spreading or recurved pedicels; calyx campanulate, about 3 mm. long; sepals rounded, entire, ciliate.

Isle of Pines, Cuba, April 24, 1904, *A. H. Curtiss.* Related to *J. stenophylla* Urban, and to *J. brevifolia* Urban, differing from both by its larger flowers with longer pedicels.

N. L. Britton.

New Binomials in an Index. — It may have escaped the notice of botanists that all new varietal or subspecific names

proposed in the Proceedings of the Biological Society of Washington appear in the index as binomials. For examples, in these Proceedings, Vol. XVII, p. 112, I described *Tetraneuris linearifolia Dodgei*, subsp. nov.; in the index, p. 185, it is called *Tetraneuris Dodgei*. On pp. 175 and 178, Professor A. Nelson described *Nemexia herbacea mclica* and *Erigeron macranthus mirus*; in the index, pp. 182 and 183, they are *Nemexia mclica* and *Erigeron mirus*. This is not done accidentally; I learned through correspondence with Mr. G. S. Miller at the time of the publication of my article, that it was held that what are usually called subspecies should be expressed by binomials, and it was not without protest that I was allowed to publish *T. Dodgei* as a trinomial. While I cannot agree with this view, the position is an intelligible one, and the committee has a right to print the names in any manner it sees fit, in a part of the Proceedings for which the several authors have no responsibility. I take it that the binomials printed as stated must be recognized (in the synonymy or otherwise, according to one's opinion), and should be credited to the publication committee, Messrs. Hay, Miller and White, who may be signified by the symbols H. M. W.

T. D. A. Cockerell.

Boulder, Colorado.

REVIEWS

Flora of Los Angeles and Vicinity*

The great area of California, its many climates and other peculiar environmental conditions, give rise to many different floras in the different parts of the state, so that local floras are greatly desired. The flora of the whole state has been only superficially examined and at the present time a compendium of the complete flora is an impossibility. There yet remain many parts to be explored and many groups of plants are but imperfectly understood. For some years to come collectors and students must work earnestly before such a work can be even planned.

* **Abrams, L. R.** Flora of Los Angeles and Vicinity. 8vo. Pp. xi + 474. Stanford University, Cal., Stanford University Press. 5 Ap 1904.

A popular manual for those students who are satisfied to know the genus to which a plant belongs or who wish only to recognize the great aggregates might be advantageously prepared, but the flora for the real student is yet many years in the future.

In selecting Los Angeles and vicinity as the subject of a local flora, Mr. Abrams has shown discrimination and foresight. His book is the first attempt to classify the plants of that populous and educated center, outside of mere lists of names and localities. The book ought to be much used, but unfortunately he has written it more for the rare scientist than for the numerous amateurs. His adoption of the metric system in a book designed to reach the public will militate against its use. The general public neither knows nor wants to know this system, and many are prejudiced against it because it is foreign. There is not one person in a thousand to whom millimeter, centimeter, etc., convey any idea. This difficulty might be obviated by the introduction of a card showing these dimensions. Reforms that go into the every-day life of an entire people can be only gradually brought about. Those enthusiasts whose ideals lead them to force reforms prematurely have to suffer for their cause.

The book is neatly gotten up in a convenient size, the type and arrangement are good, the families are according to the system of Engler and Prantl, and, in general, the modern American system of nomenclature is used, but not the extreme dividing of families and genera such as prevails in a recent publication. Where changes in generic names occur, the former well-known synonym is always given both in the text and index. In species-making the author has been conservative, especially in some groups that are in great need of revision. In these cases the descriptions are frequently adapted instead of being original. This appears more sensible than giving an original description to a plant whose name is uncertain or to a name where the plant is not distinctly recognized.

Of course it is not possible to include every species within the limits, and so additions will be cropping up all the time. During a brief visit to Pasadena in May I saw *Viola praemorsa* on Mt. Wilson; *Lupinus gigantea* along a small shady stream a short

distance from Pasadena; *Lithophragma heterophylla* in a shady canyon near Pasadena; *Arabis arcuata* on Mt. Wilson. Mr. George B. Grant reports the following: *Polygonum ramosissimum*, *Tissa rubra*, *Reseda lutea*, *Sphaeralcea Fendleri California* Parish, *Lupinus Stiversi* and *L. formosus*, *Corethrogyne filaginifolia*, *Avena barbata*, *Salix sessilifolia Hindsiana*, *Monardella macrantha*, *Lavatera assurgentiflora*, *Lepidium latipes*, and *Euphorbia maculata*. These have all been verified by Parish and others.

It is easy to find fault, but too much praise cannot be given to the painstaking, conscientious care that is evident on every page of the book. Those who use it will scarcely have any idea of the great amount of work that falls to every pioneer in a new field.

ALICE EASTWOOD.

PROSPECTUS OF THE WORK OF THE TORREY BOTANICAL CLUB DURING 1905

The interest of the members and friends of the Club is earnestly solicited in its proposed work for the coming year. During the past decade the Club's scientific work and standing have advanced greatly, placing it among the foremost scientific societies in the world. In the meantime its local work, and the local interest in it and in its proceedings, have not benefited proportionately. In such a society, located in such a community as ours, the number of persons interested as amateurs should be many times greater than that of those professionally interested in botany. The charter and constitution of the Club clearly set forth that one of its principal objects is to extend an interest in botanical subjects, which extension is only possible by leading those not interested to become so. It is hardly to be expected that this interest will be engendered by the presentation alone of the results of abstruse researches in subjects which have as yet developed no popular features. On the other hand, research work almost invariably requires material assistance from without, which can in no other way be so well supplied as by the coöperation of an associated membership. In return for such coöperation, the society should provide matter of instruction and interest of a different character

or grade from that which specially interests its more advanced students. If the Torrey Botanical Club had forced upon it the alternative of relapsing into its old days of dilettanteism, it would probably be justified in preferring a state of dignified semi-starvation; but no such alternative is presented. It is quite practicable for us to enjoy the beauty, grace, and sociability, which characterized the Club's life a dozen years ago, while making this very gain contributory to its higher scientific life. It is toward this object that the various working committees of the Club will direct their efforts during the coming year, and for which they ask the necessary coöperation of the members.

The new home of the Club at the American Museum of Natural History is convenient, commodious and beautifully furnished and equipped, and it is hoped that the members will meet there in large numbers and will discuss with animation the very many and varied botanical interests which the city now affords. Among the interesting features of our afternoon and evening meetings during the coming year will be the following: The results of the critical studies of local plants made during the last decade will be discussed and illustrated. On May 9, there will be a "Violet Evening," when all obtainable forms of violets will be exhibited and discussed, as to identity and habits, and the results of cultivation of native violets at the Botanical Garden will be presented. In October, an evening will be similarly devoted to the study of asters and golden-rods. On both occasions special collections will be made in the different characteristic localities of our local area. Mr. Nash will devote an evening to the exhibition of the principal types of cultivated orchids, and Dr. Britton will similarly discuss Cactaceae at an afternoon meeting to be held in the cactus house of the Garden. An evening meeting will be devoted to a consideration of the trap-rock flora of Essex County N. J. Dr. Small will give an illustrated paper on the mountain flora of the southeastern United States.

The work of the Field Committee will also be conducted in such a way as to provide instruction of a more systematic character than heretofore, and will at the same time be made more interesting. Work upon the local flora will be organized by the

committees having it in charge, and will be largely carried out in connection with the excursions. One of the April excursions will be conducted by Professor Lloyd, with the particular object of illustrating the seasonal adaptations of the earliest spring flowers. A sea-side excursion will be devoted to an illustration of the local types of marine algae, by Dr. Howe. Dr. Murrill will devote an afternoon at Scarsdale, New York, to illustrating the habits of different classes of fungi. In June there will be a "Lupine Excursion" to Pompton, where a large hill entirely covered by this plant will be visited, and where other floral features of great interest and beauty will be enjoyed. On May 6, Professor Underwood will entertain us at Redding, Conn. Dr. Hollick will devote a day to palæobotanical collecting at Glen Cove, and will explain the appearance of the region and its geographical and botanical relations at the time that the plants were living.

Not only are the members requested to participate more freely in the indoor and field-meetings, but they are specially urged to increase the Club's membership. There are hundreds of persons in and about New York who should be members, by virtue of their interest in wild plants or in other botanical subjects, but to whom the Club is unknown. If our members would, at the expense of a very little trouble, seek out such persons and make our objects and proceedings known to them, many would be induced to become members, to their and our mutual advantage. We have met people who had been deterred from seeking membership through a mistaken idea as to the qualifications required or expected, and who promptly presented their applications upon learning that an interest in plants sufficient to make our meetings, excursions, or literature attractive to them constitutes a sufficient qualification to make them welcome as members.

Henry H. Rusby,
President.

PROCEEDINGS OF THE CLUB

Tuesday, January 10, 1905

The annual business meeting was held at the College of Pharmacy, President Brown in the chair and twenty members present.

W. W. Eggleston of the N. Y. Botanical Garden was elected to membership.

Resignations were accepted from Miss Theresa G. Williamson, Miss Nina L. Marshall, Miss Margaret F. Jagger, Mrs. Lillian Howard Perry, Mrs. Millie T. Ries and John P. Conroy.

The annual report of the treasurer showed gross receipts of $2,697.80 for the year and expenditures amounting to $2,226.80.

The report of the recording secretary showed that the club had held twelve regular meetings during the year with an average attendance of 19, and had listened to 23 stated papers.

The report of the editor-in-chief showed that the current volume of the *Bulletin* contained 682 pages and 26 plates besides numerous text-figures. Vol. 13 of the *Memoirs* was reported in press and partially printed.

Verbal reports were received from the editor of Torreya, the corresponding secretary, the chairman of the field committee, and the committee on local flora.

Professor Underwood, chairman of the committee on index cards of current botanical literature submitted a report covering four years and showing receipts of $783.21 and expenses of $643.21. His committee proposed withholding a small reserve fund, and signified the intention of turning over $115.00 to the Club.

The following resolution was presented:

Resolved: That the Torrey Botanical Club, recognizing the importance of preserving natural scenery in public parks, such as would be permanently injured by the proposed railway line through south Bronx Park, heartily joins other organizations in protesting against the construction of such road through Bronx Park.

This resolution was unanimously passed and copies were ordered mailed to the Rapid Transit Commission and the public press.

A letter was read from President Brown declining a reelection and the following resolution, proposed by Dr. Britton, was put by Vice-President Rusby and unanimously adopted by a rising vote :

Resolved, That the Club receives the letter of its President, ex-Judge Addison Brown, refusing a renomination to that office, with very deep regret, and

Resolved, That the Club hereby expresses its gratitude to Dr. Brown for his valuable services as President during the past fifteen years, and its hope and expectation that he will continue to give the Club the advantage of his wisdom and advice.

The Club then proceeded to the election of officers for the ensuing year.

Nominations were made and upon motion the secretary cast an affirmative ballot for the following : *President*, Henry H. Rusby ; *Vice-Presidents*, Edward S. Burgess and L. M. Underwood ; *Treasurer*, F. E. Lloyd ; *Recording Secretary*, Edward W. Berry ; *Corresponding Secretary*, John K. Small ; *Editor*, John H. Barnhart ; *Associate Editors*, N. L. Britton, Tracy E. Hazen, Marshall A. Howe, D. T. MacDougal, W. A. Murrill, H. M. Richards, and Anna Murray Vail.

A short address of acceptance was made by President-elect Rusby.

The question of changing the place of meeting of the first meeting in each month from the College of Pharmacy to the American Museum of Natural History was introduced and after discussion it was moved that Drs. Rusby and Britton be constituted a committee with power to make such change provided that the expense proved to be trifling.

EDWARD W. BERRY,
Secretary.

TUESDAY, FEBRUARY 14, 1905.

The meeting was held at the American Museum of Natural History, President Rusby in the chair and fifteen members present.

Minutes of the annual meeting were read and approved.

The president appointed the following standing committees and delegates :

Finance, J. I. Kane, C. F. Cox; *Admissions*, E. S. Burgess, Delia W. Marble, John K. Small; *Local Flora, Phanerogamia*, N. L. Britton, E. P. Bicknell, Fanny A. Mulford, W. W. Eggleston; *Local Flora, Cryptogamia*, L. M. Underwood, M. A. Howe W. A. Murrill, Elizabeth G. Britton; *Program*, N. L. Britton, M. A. Howe, L. M. Underwood; *Field Excursions*, Eugene Smith, Geo. V. Nash, Marie L. Sanial, E. W. Berry, Percy Wilson, H. H. Rusby; *Delegates to the Council of the Scientific Alliance*, H. H. Rusby, N. L. Britton, Addison Brown; *Delegates to the International Botanical Congress at Vienna*, N. L. Britton, L. M. Underwood.

Of the scientific program, the first paper, which was illustrated by lantern slides, was by Dr. George H. Shull, and was entitled "Stages in the Development of *Sium cicutaefolium*." Dr. Shull presented briefly the great range of leaf-form in this species at different stages of growth, concluding that these various stages give no safe indication of ancestral forms.

The life-cycle of *Sium* fits it for the conditions under which it grows at different stages of its growth, it being mesophytic, hydrophytic and xerophytic in turn. This cycle of changes seems to be independent of external conditions and proceeds regularly without regard for the environment. The consideration of a number of rejuvenated buds shows that rejuvenescence may be brought about by submerging senescent buds in water, and that the later the stage of senescence the earlier will be the juvenile forms which are induced to appear. Evidences were presented tending to prove that the proximal leaflets of pinnate leaves are homologous in any series of leaves taken from the same plant and that the other leaflets are likewise homologous counting from the proximal pair.

The paper was the subject of considerable discussion.

The second paper was by Dr. Tracy E. Hazen, on "Recent Advances in the Phylogeny of the Green Algae." The subject was introduced by a sketch of Borzi's group Confervales, now enlarged into the class Heterokontae, comprising genera showing natural affinities, taken from the three old orders Protococcales, Confervales and Siphoneae. This new class, accepted by all

recent investigators, serves to indicate the artificiality of the traditional classification.

The clearer lines of descent of the chief groups of Chlorophyceae from the unicellular, motile *Chlamydomonas* were traced; the first tendency, in the direction of aggregations of motile cells, finding its highest expression in *Volvox*; the second tendency, in the direction of septate cell division, to form non-motile bodies of increasing solidarity, leading through the Tetrasporaceae to the Ulvaceae (which have been placed in a separate order, Ulvales, by some recent authors), and finally, through such forms as *Stichococcus*, to the typical filamentous and branched forms culminating in *Coleochaete*. The third, or Endosphaerine tendency from *Chlamydomonas*, as suggested by Blackman, was held by the speaker to furnish an unsatisfactory origin for the Siphoneae, inasmuch as the endophytic forms associated with *Endosphaera* may be regarded as too specialized in their mode of life at least. It is much more natural to derive the Siphoneae from the septate, multinucleate Cladophoraceae. The latter group may well be regarded as an intermediate order, easily derived from the Ulotrichaceae through such forms as *Hormiscia* (*Urospora*) and *Rhizoclonium*.

The recent proposition of Bohlin and Blackman to regard the Oedogoniaceae as forming a class derived from a separate unicellular ancestor is at least premature, and it does not appear at all impossible that this group may have been derived from a *Ulothrix*-like form as suggested by Oltmanns. The Conjugatae furnish a perplexing problem, but the speaker preferred to regard this group as forming an order of Chlorophyceae rather than as a separate class, in view of present evidence.

Edward W. Berry,
Secretary.

NEWS ITEMS

The tenth annual winter meeting of the Vermont Botanical Club was held at Burlington, January 18–19, with President Ezra Brainerd of Middlebury College in the chair. Twenty-two papers

were presented, representing numerous lines of botanical study. The following officers were elected for the ensuing year: President, Ezra Brainerd; vice-president, C. G. Pringle; secretary, Professor L. R. Jones; treasurer, Mrs. Nellie F. Flynn; members to serve with the officers as executive committee, Professor J. W. Votey, Mrs. Sarah K. Lord, and Carlton D. Howe. A committee was appointed to investigate the feasibility of attempting to publish the proceedings and the papers presented before the club. For the summer meeting in July a boat will probably be chartered for a cruise among the islands and along the shore of Lake Champlain.

Dr. and Mrs. W. A. Murrill are spending a month in Cuba, where they are occupied chiefly in making collections of fleshy fungi for the New York Botanical Garden.

Dr. C. Stuart Gager, assistant in the laboratories of the New York Botanical Garden, has been acting professor of botany in Rutgers College, New Brunswick, New Jersey, since January. Dr. Gager will have charge of the botanical instruction in the summer sessions of the New York University.

The Associated Press dispatches announce that Colonel Valery Havard was one of the two American attachés of the Russian army who were captured by the Japanese during the recent battle of Mukden. Dr. Havard is a well-known member of the Torrey Club and is author of several papers relating to American economic plants. He left New York on November 17 under commission to join the Russian army in Manchuria as military medical observer for the United States.

Dr. and Mrs. N. L. Britton and Dr. Marshall A. Howe, of the New York Botanical Garden, and Dr. C. F. Millspaugh of the Field Columbian Museum, Chicago, have returned from a six weeks' collecting expedition to the Bahama Islands. A schooner was chartered at Nassau and visits were made to the Berry Islands, the Great Bahama, and the islands of the Exuma Chain. The collections include living plants, herbarium specimens, and fluid-preserved material, representing about 1,400 collection numbers of spermatophytes and higher cryptogams and about 900 of marine algae.

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TORREYA

April, 1905

SOME NOTEWORTHY STATIONS FOR PINUS PALUSTRIS

By Roland M. Harper

While collecting timber specimens for the Georgia State Museum during the winter of 1903–'04, I had exceptional opportunities for studying the distribution of *Pinus palustris* in the northwestern quarter of that state. Although it has been known for some time that this characteristic tree of the coastal plain is found far inland in Georgia and Alabama, scarcely anything has been published in regard to its exact distribution in Northwest Georgia.*

Consequently I was not a little surprised on ascending Pine Mountain † in Bartow County, about three miles east of Carters-

* The occurrence of long-leaf pine in northwest Georgia must have been known to the white settlers as soon as that part of the state was taken from the Indians, about 70 years ago, but I have found no record of this fact in botanical literature dating back more than 25 years. Professor Sargent in his Catalogue of Forest Trees, published in 1880, says of this tree, "not extending more than 100 miles from the coast," and in his report for the Tenth Census, published four years later, he says "rarely extending beyond 150 miles from the coast." But Dr. Mohr, in a report on the forests of Alabama, published in 1880, vaguely refers to the occurrence of this species on the mountains of that State. (And in his "Timber Pines of the Southern United States" and "Plant Life of Alabama," published many years later, numerous details are given.) In 1883 Messrs. J. L. Campbell and W. H. Ruffner, in a pamphlet entitled "A Physical Survey in Georgia, Alabama and Mississippi, along the line of the Georgia Pacific Railway, embracing the Geology, Topography, Minerals, Soils, Climate, Forests, and Agricultural and Manufacturing Resources of the Country," mention the occurrence of *Pinus palustris* in Polk and Haralson counties and adjacent Alabama. In a book entitled "The Commonwealth of Georgia," published by the State Agricultural Department in 1885, there is a forestry map showing among other things a narrow belt of long-leaf pine entering the state near Tallapoosa and terminating near Kingston. Some car-window observations on this belt by the writer were published a few years ago (Bull. Torrey Club, 28: 455. 1901).

† Not to be confused with the Pine Mountains of Meriwether and adjoining counties. See Bull. Torrey Club, 30: 292–294, *f. 3*. 1903.

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ville, on December 10, 1903, to find the long-leaf pine common on its upper slopes. Pine Mountain, it should be explained, is a peak of quartzite rock, about 260 miles from the coast, forming part of the bold escarpment which marks the inland edge of the Metamorphic region and overlooks the broad valleys and low ridges of Palaeozoic rocks to the northwestward. The summit of this mountain, according to the topographic maps of the U. S. Geological Survey, is 1,500 feet above sea-level and about 800 feet above the Etowah River at its southern base. Going up the mountain from the river, *Pinus palustris* is first encountered at about the 1,000-foot contour, and continues the rest of the way up, the tops of some of the trees being less than ten feet below the summit of the mountain. It is principally confined to the southern slope, where it is the predominating tree above the altitude mentioned, and is associated with such plants as *Pteridium aquilinum*, *Pinus echinata*, *Andropogon scoparius*, *A. Virginicus*, *Aletris farinosa*, *Quercus Marylandica*, *Q. Prinus*, *Cracca Virginiana*, *Ceanothus Americanus*, *Viola pedata*, *Dasystoma pectinata*, *Eupatorium album*, *Chrysopsis graminifolia*, *Solidago odora*, *Sericocarpus linifolius*, *Silphium compositum*, *Helianthus divaricatus*, and *Coreopsis major Oemleri*, all but one or two of which are common inhabitants of dry pine-barrens in the coastal plain. (A visit to this place in summer would of course reveal a much larger number of species.) A similar flora is found in the corresponding portions of Alabama, according to Dr. Mohr,* and on the southern slopes of the mountains of southwestern Middle Georgia.†

On the date above mentioned, and again three days later, I had the novel experience of standing in a forest of long-leaf pine while viewing some of the highest mountains in the state, many miles to the northeastward, which were covered with snow at that time. (I could also see Stone Mountain, 42 miles southeast, and many nearer peaks.) Pine Mountain is at present the northeasternmost known station for *Pinus palustris* in the mountain region, and is within 40 miles of the known range of *Pinus*

* Contr. U. S. Nat. Herb. 6 : 59-61. 1901.

† Bull. Torrey Club, 30 : 294. 1903.

Strobus. Some of the long-leaf pines there are over two feet in diameter, and but for their inaccessibility they would probably have been cut long ago.

The distribution of the other pines on the same mountain is of sufficient interest to merit a few remarks in passing. *Pinus Taeda* was seen only on the lower slopes, and did not seem to associate with *P. palustris* at all. (It rarely ascends over 1,000 feet above sea-level in any part of its range.) *P. echinata* ranges a little higher, and associates with *P. palustris* at the latter's lower limit, near the 1,000-foot level. *P. Virginiana* occurs at the summit and nearly all over the northern slope, and associates with *P. palustris* at several places east and west of the summit. I have never seen *Pinus Virginiana* associated with *P. palustris* anywhere else, and their ranges are almost entirely distinct, only overlapping a few miles in Georgia and perhaps in Alabama.

I did not see the long-leaf pine elsewhere in Bartow County, but the following month, January, 1904, I traced it through some of the counties bordering on Alabama, namely, Floyd and Polk in the Palaeozoic region and Haralson and Carroll in the Metamorphic. At the same time I was reliably informed of its occurrence in Chattooga County, which is just north of Floyd and must be the northern limit of this tree in Georgia.

In Floyd County, *Pinus palustris* is frequent on the dry southern slopes of Horseleg Mountain near Rome and Heath Mountain near Coosa (on Upper Silurian strata and about 1,000 feet above sea-level in both cases), and it doubtless grows on other mountains in the same county. On Horseleg Mountain the other three pines mentioned above as occurring in Bartow County are distributed in much the same way as on Pine Mountain, *Pinus Taeda* prevailing at the lower levels and *P. Virginiana* at the higher levels. The mountain long-leaf pine is usually of lower stature than that in the coastal plain, with shorter leaves and shorter more crooked branches, all of which is a natural consequence of the comparative severity of the climate.

In Polk County, where mountains are scarce and the average altitude of the country is about 800 feet, *Pinus palustris* occurs frequently, but nowhere abundantly. Going from Polk County

south into Haralson, one ascends rather abruptly the escarpment (known here as Dugdown Mountain) at the edge of the Metamorphic region, and emerges onto a comparatively level region of considerable elevation. In Haralson County the average altitude is something like 1,300 feet (the extremes about 900 and 1,600), and *Pinus palustris* is very common, though never constituting a majority of the forest growth as it does in the pine-barrens. In Carroll County the general elevation is a little less and this pine not quite so abundant, though some individuals of it are nearly if not quite three feet in diameter.

In these two Middle Georgia counties (Haralson and Carroll) *Pinus Taeda* and *P. echinata* occur commonly with *P. palustris*, or at least at the same altitudes. *P. Virginiana* is not known south of Floyd County.*

A rather remarkable feature of the occurrence of *Pinus palustris* in upper Georgia is its decided preference for high altitudes. In that portion of the state northwest of the Chattahoochee River it is not often seen below 1,000 feet; while in the coastal plain, its normal home, there is very little of it above 400 feet. In the mountains of Alabama it flourishes at even higher altitudes than in Georgia, according to Dr. Mohr,† who found it at nearly 2,000 feet in Talladega County in 1896.

Why this species grows among the mountains at all is a question which has been very little discussed and never satisfactorily answered.‡ Dr. Mohr thought the nature of the soil fully accounted for it, but there are other factors to be taken into consideration. For the present range of *P. palustris* in upper Georgia is not coextensive with any particular type of soil, and there are many places in eastern Middle Georgia which are equally sandy but have no long-leaf pine.

* I should mention here perhaps that the "*Pinus pungens*" which I reported a few years ago as occurring in Northwest Georgia (Bull. Torrey Club, 28: 462. 1901) was incorrectly identified, and is really *P. Virginiana*. Its appearance in Georgia is so different from that of the scrubby specimens which one sees along the fall-line in Maryland and Virginia that I did not at first recognize it to be the same.

† See his "Timber Pines of the Southern United States" (revised edition), p. 73; also "Plant Life of Alabama," pp. 60, 323.

‡ See in this connection Mr. Kearney's interesting paper in *Science* for November 30, 1900, where he discusses the occurrence of many other coastal plain plants in the mountains of Tennessee and Alabama.

Two or three other theories readily suggest themselves.

First, it might be supposed that the original home of this tree was among the mountains, before the coastal plain assumed its present form or became adapted to the growth of this species. But the fact that it is so much more abundant and widely distributed in the coastal plain than in the mountains makes this supposition improbable.

Again, it will be noticed that it is just in this longitude (85° W.) that the fall-line (east of the Mississippi) bends farthest south, and it is possible that the climate or some combination of causes has created a tension in the range of *Pinus palustris* sufficient to cause it to break through the barrier * here and overflow, as it were, into the Piedmont region and mountains beyond for a distance of over 100 miles. As the limit of its distribution in this region does not coincide with any known geological or climatic line, it is not unlikely that its range was restricted only by the time elapsed since it broke through the fall-line, and it may have been still spreading at the time civilized man appeared on the scene and stopped it.

Another possible explanation is this. In most of the counties from Floyd southward to the fall-line there are frequently found, mostly near streams, considerable areas of unconsolidated deposits believed to be of Pleistocene age, lying unconformably on the older rocks. These indicate that much of this land was submerged beneath the sea in comparatively recent geological times, probably not antedating the appearance of most of our living species of trees. Perhaps *Pinus palustris* and several other species which have a similarly anomalous distribution (*e. g.*, *Quercus lyrata*, *Q. Michauxii*, *Magnolia glauca*, *Ilex glabra*,† *Nyssa uniflora*), retreating before the advance of the Pleistocene sea, found congenial homes among these highlands, with soil suited to their needs, and have therefore remained ever since.

Notwithstanding the abundance of long-leaf pine in the region under consideration, it seems to be very little used for lumber, and not at all for turpentine. A part of the charcoal which is

*See Bull. Torrey Club, 31 : 10. 1904.

†See C. L. Boynton, Biltmore Bot. Stud. 1: 144. 1902.

made in considerable quantities in Bartow, Floyd, and Polk counties to supply the iron furnaces in the vicinity doubtless comes from this species, but in Haralson and Carroll Counties the only evidence I saw of its being used in any way was a few logs at a small sawmill in Bremen. It is probably not abundant enough in these highlands to make its exploitation profitable at present in competition with the much greater supply in the coastal plain. A great deal of it was doubtless destroyed in clearing the land for agricultural purposes before its timber was as much in demand as it is now.

College Point, New York.

TERMS APPLIED TO THE SURFACE AND SURFACE APPENDAGES OF FUNGI

By William A. Murrill

Glossary of Terms

Abrupt, terminating suddenly.
Aculeate, having prickles.
Aculeolate, having small or few prickles.
Alveolate, deeply pitted like a honeycomb.
Anastomosing, forming a net-work.
Annulate, marked with rings or circular transverse lines.
Anoderm, without a crust or skin.
Appendiculate, decorated with small fragments of the veil; used of the margin.
Applanate, flattened out horizontally.
Appressed, lying close.
Arachnoid, cobwebby; of slender entangled hairs, which are fewer and longer than in *tomentose*. Used chiefly of the veil.
Areolate, marked out into small spaces; reticulate.
Asperate, rough with short stiff hairs or points.
Barbed, bearded, having stiff hairs.
Barbulate, finely bearded.
Bibulous, absorbing moisture.
Bifurcate, forked.
Bossed, umbonate.
Bristly, clothed with stiff short hairs.
Bullate, blistered or puckered.
Byssaceous, byssoid.
Byssoid, filamentous, cobwebby, as in the mycelium. Used chiefly of the margin.
Callose, having hardened spots or warts.
Calvous, bald; destitute of hairs usually present.
Canaliculate, deeply channeled; used chiefly of the stem.
Canescent, gray or whitish from a coating of fine hairs.
Carbonaceous, black and brittle like coal or charcoal.
Carnose, fleshy; soft, but firm.
Cartilaginous, firm and tough like cartilage.
Ceraceous, wax-like.
Chaffy, covered with thin dry scales.
Channeled, having deep longitudinal furrows.
Chartaceous, with the texture of parchment or writing-paper.
Ciliate, fringed with hairs or bristles.

Circinate, arranged in a circle.
Cirrhose, tipped with a wavy thread-like appendage.
Clathrate, latticed.
Colliculose, covered with hillock-like elevations.
Comose, bearing a tuft of hairs.
Compressed, flattened laterally; used chiefly of the stem.
Concave, incurved.
Concentric, having a common center.
Confervoid, consisting of loose filaments.
Confluent, running together, blended into one.
Contorted, twisted, crooked.
Convex, arched.
Coriaceous, of a leathery texture.
Corky, firm and elastic like cork.
Corneous, of a horny texture.
Corrugated, irregularly crumpled in folds or wrinkles.
Cortex, the rind or bark; a substantial outer layer.
Corticate, having a rind or cortex.
Costate, having one or more prominent ribs or veins.
Crenate, furnished with rounded teeth.
Crenulate, minutely crenate.
Cribrate, cribrose.
Cribrose, porose, perforated.
Crustaceous, forming a closely adhering crust or layer.
Dealbate, covered with a very white bloom or powder, as though white-washed.
Dentate, bearing broad sharp teeth pointing directly outward.
Denticulate, minutely dentate.
Depressed, somewhat sunken at the center.
Determinate, having a distinct outline; used of the margin.
Diaphanous, nearly or quite transparent.
Diffuse, spreading widely, loosely or irregularly; used chiefly of the margin.
Disc, the central portion of the surface of the pileus.
Downy, having a dense covering of short weak hairs.
Dissected, cut deeply into many divisions.
Echinate, furnished with stiff bristles.
Echinulate, minutely spinose; used chiefly of the surface of spores.
Effuse, loosely spreading.
Effused, effuse.
Elastic, returning to its original position when pressed or bent.
Encrusted, covered with a hard skin or crust.
Entire, destitute of teeth or notches.
Erose, having the edge ragged as though torn or bitten.
Eroded, erose.
Evanescent, disappearing at a very early stage.
Even, without elevations or depressions.
Exasperate, covered with short hard points.
Expanded, spread out.
Explanate, spread or flattened out instead of rolled or folded as usual.
Farinose, covered with a white mealy powder.
Fasciated, marked with broad parallel stripes.
Fascicled, growing in close bundles or clusters.
Favose, honey-combed.
Fibrillose, bearing firm loose fibers or threads.
Fibrous, composed entirely or mostly of separable threads.
Filamentous, slender and thread-like.
Fimbriate, fringed with loose slender processes larger than hairs.
Fimbrillate, minutely fringed.
Fissile, capable of being split or divided.
Flaccid, relaxed, wilted, not able to hold up its own weight.
Fleshy, soft, but firm, as in a potato. Neither gelatinous nor cartilaginous.
Flexuose, zigzag, winding.
Floccose, clothed with locks or tufts of soft woolly hairs.
Flocculent, floccose.

Flocculose, minutely floccose.
Foveate, marked with pits or depressions.
Foveolate, marked with small pits or depressions.
Fugacious, fading or falling away in a very short time.
Furfuraceous, covered with soft bran-like scales or scurf.
Gibbous, protuberant or swollen at some definite part.
Glabrate, nearly glabrous, or becoming glabrous.
Glabrescent, slightly glabrous.
Glabrous, free from hair, scales, warts or other appendages; not necessarily smooth or even, but usually so.
Glair, a hyaline viscid substance like the white of an egg.
Glaucous, covered with a whitish bloom.
Glutinous, sticky to the touch.
Granular, composed of or covered with minute grains.
Grooved, somewhat furrowed lengthwise; used chiefly of the stem.
Guttate, discolored with small dots.
Guttulate, apparently sprinkled with small drops of oil or resin.
Gyrate, folded like the surface of the brain, convoluted.
Gyrose, gyrate.
Hirsute, clothed with rather long hairs, coarser than in *pubescent* and not so stiff and erect as in *hispid*.
Hirtellous, slightly hirsute.
Hispid, beset with erect stiff hairs or bristles, either long or short.
Hispidulous, minutely hispid.
Hoary, grayish-white on account of a fine coating of hairs.
Hyalescent, somewhat hyaline.
Hyaline, transparent or translucent.
Hygrometric, readily absorbing and holding moisture.
Hygrophanous, apparently water-soaked; translucent when wet, opaque when dry.
Imbricate, overlapping like the shingles on a roof.
Imbricated, imbricate.
Immarginate, without a distinct edge or border.
Incanescent, somewhat hoary.
Incanous, hoary.
Incised, deeply cut into irregular projecting parts.
Indeterminate, diffuse; used chiefly of the margin.
Indurated, hardened.
Innate, blending with the substance.
Intumescent, swelling up, becoming tumid.
Involute, rolled tightly inward or downward upon itself; the opposite of *revolute*.
Labyrinthine, marked with intricate sinuous lines or grooves.
Laccate, apparently varnished.
Lacerate, divided into irregular segments, as if torn.
Laciniate, deeply cut or slashed into narrow segments, which are larger and more irregular than in fimbriate.
Lacinulate, finely laciniate.
Lacinulose, lacinulate.
Lacunose, pitted with shallow holes, which are larger and less regular than in *alveolate*.
Lanate, woolly.
Latticed, interlacing, with spaces between.
Lax, loose, flaccid.
Ligneous, woody.
Lobate, deeply divided into rounded parts with broad sinuses.
Lobed, lobate.
Lobulate, having small lobes.
Lucid, transparent.
Maculate, spotted.
Maculose, maculate.
Marbled, faintly and irregularly striped or veined.
Membranaceous, membranous.
Membranous, thin, soft and often translucent.
Merismoid, subdivided into small pilei.
Micaceous, covered with glistening particles.

Mucedinous, mould-like.
Mucilaginous, slimy.
Multifid, deeply cleft into many segments.
Muricate, rough with short hard points.
Naked, destitute of the covering usually present.
Nebulose, clouded.
Nodulose, covered with pimples or knots.
Obsolete, suppressed or scarcely apparent.
Obtuse, rounded, blunt.
Opaque, having a dull appearance; neither transparent nor shining.
Osseous, of a bony texture.
Pallescent, somewhat pale.
Pallid, lacking in color; of an indistinct watery or dirty-white color.
Papillate, having minute soft tubercles like those on the tongue.
Papillose, papillate.
Papyraceous, papery.
Patent, spreading; used of the margin.
Pectinate, divided into narrow comb-like teeth.
Pellicle, a thin distinct outer layer or skin; not thick and hard like a crust.
Pelliculose, covered with a pellicle.
Pellucid, translucent.
Penicillate, bordered with fine hairs like those of a camel's-hair brush.
Peridium, the outer layer or covering of a closed fungus fruit-body, like a puff-ball.
Persistent, firmly attached and lasting.
Piliferous, pilose.
Pilose, bearing long soft hairs, more or less erect and separate.
Pitted, marked with small depressions.
Plane, flat.
Plicate, folded lengthwise, as in a fan.
Plicatulate, minutely plicate.
Polished, smooth and shiny.
Porose, pierced with many small, rounded openings.
Premorse, appearing as if bitten off.
Proliferous, producing offshoots.
Pruinose, covered with a whitish powdery bloom as if frosted.
Puberulent, minutely pubescent; having a few short soft hairs.
Pubescent, covered with short soft downy hairs.
Pulveraceous, pulverulent.
Pulverulent, dusty or powdery.
Punctate, having transparent or colored points or dots.
Pustulate, having pimples or blisters, usually somewhat larger than in *papillate*.
Radiant, radiating.
Radiate, radiating.
Radiating, spreading from a common center.
Ramose, bearing branches, usually many in number.
Recurved, bent backward ninety degrees or less.
Reflected, reflexed.
Reflexed, bent backward more than ninety degrees or, if less, bent more abruptly than in recurved.
Repand, wavy; used chiefly of the margin.
Resupinate, reversed, inverted.
Reticulate, marked like a net with meshed fibers.
Revolute, strongly curved or rolled backward or upward; opposite of *involute*.
Rigescent, nearly rigid.
Rigid, firm, stiff, unyielding.
Rimose, marked with numerous clefts or cracks.
Rimulose, minutely rimose.
Rivulose, marked with fine wavy channels or grooves.
Rotund, rounded.
Rugose, wrinkled.
Rugulose, minutely wrinkled.
Satiny, glossy like satin.
Scabrate, scabrous.
Scabrid, slightly scabrous.
Scabridous, somewhat scabrid.
Scabrous, rough with minute hard points or short stiff hairs.
Scaly, covered with scales, which are usually fibrous.

Scariose, scarious.
Scarious, dry and membranous.
Scrobiculate, deeply and irregularly pitted.
Sebaceous, wax-like.
Sericous, silky; covered with fine straight glossy hairs.
Serrate, having sharp teeth pointing forward as in a circular saw.
Serrulate, finely serrate.
Setaceous, setose.
Setigerous, setose.
Setose, beset with bristles.
Setulose, beset with fine bristles.
Shaggy, villose or hirsute.
Silky, covered with close-pressed soft and straight pubescence.
Sinuate, strongly waved; used chiefly of the margin.
Sinuous, curving to the right and left.
Smooth, even, without inequalities. Not necessarily glabrous.
Soft, tender and yielding to the touch.
Spinose, spine-like or having spines.
Squamose, covered with coarse scales.
Squamulose, covered with minute scales.
Squarrose, rough with projecting scales.
Squarrulose, minutely squarrose.
Striate, marked lengthwise with fine lines or ridges.
Striatulate, minutely striate.
Strigose, covered with small bristles.
Strumose, swollen on one side.
Stupose, covered with matted tow-like hairs.
Sub-, a prefix meaning under, beneath, somewhat, or partially.
Suberose, corky.
Subulate, awl-shaped.
Sulcate, marked with one or more conspicuous grooves or furrows.
Tessellate, checkered; marked with little squares like those on a checkerboard.
Tessellated, tessellate.
Tomentose, covered with densely matted woolly hairs.
Tomentous, tomentose.
Tomentulose, minutely tomentose.
Tomentum, matted woolly hairs.
Tortuous, turning in various directions.
Tremelloid, gelatinous.
Truncate, abrupt, as though cut off; used chiefly of the margin.
Tuberculose, covered with small irregular pimples.
Tumid, swollen.
Tunicate, covered with a thin separable coat.
Umbilicate, having a small abrupt central depression.
Umbonate, having a rather prominent rounded elevation in the center.
Umbonulate, subumbonate.
Unctuous, having an oily or greasy appearance.
Undulate, waved or uneven near the margin.
Velutinous, velvety.
Velvety, closely and evenly covered with fine erect hairs.
Vernicose, varnished.
Verrucose, covered with wart-like elevations.
Verruculose, minutely verruculose.
Villose, covered with long, weak, nearly straight hairs, which are softer and denser than in *pilose*.
Virgate, streaked.
Viscid, sticky, glutinous.
Vitreous, hyaline, transparent like glass.
Vittate, longitudinally striped or ridged.
Woolly, clothed with long twisted or matted hairs.
Wrinkled, contracted and crumpled.
Zonate, marked with concentric lines or bands of color.
Zoned, zonate.

Synopsis of Terms*

A. General terms applied to the Surface as a whole.
   1. Relating to form.
   2. Relating to texture.
   3. Relating to color due to texture.

B. Terms applied to the Margin in particular.

C. Surface Markings.
   1. Rounded markings.
      a. Dots.
      b. Depressions.
      c. Elevations.
   2. Elongated markings.
      a. Irregular.
      b. Regular.

D. Surface Coverings.
   1. Mucilage.
   2. Powder.
   3. Scales.
   4. Hairs.
      a. Kinds of hairs.
      b. Fine hairs.
      c. Coarse hairs.
      d. Stiff hairs.
   5. Sharp elevations.

A. General Terms Applied to the Surface as a Whole

1. Relating to form:
   applanate, *plane*, glabrous, smooth, *even*, depressed, concave, expanded, explanate, contorted, convex, compressed, resupinate, crustaceous.
2. Relating to texture:
   mucedinous, confervoid, fibrous, gelatinous, *tremelloid*, soft, waxy, *sebaceous*, *ceraceous*, fleshy, *carnose*, membranous, *membranaceous*, spongy, bibulous, hygrometric, scariose, *scarious*, papery, *papyraceous*, *chartaceous*, crustaceous, carbonaceous, cartilaginous, leathery, *coriaceous*, corky, *suberose*, woody, *ligneous*, indurated, bony, *osseous*, horny, *corneous*, rigescent, rigid, elastic; anoderm, tunicate, pelliculose, corticate, encrusted, pellicle, cortex, peridium.
3. Relating to color due to texture:
   opaque, pallid, *pallescent*, hygrophanous, polished, unctuous, translucent, *hyalescent*, *pellucid*, hyaline, *diaphanous*, *lucid*, *transparent*, vitreous.

B. Terms Applied to the Margin in Particular

immarginate, truncate, *abrupt*, obtuse, *rotund*, *tumid*, acute, patent, recurved, reflexed, *reflected*, revolute, involute; undulate, striatulate, striate; entire, repand, sinuate, determinate, diffuse, *effuse*, *indeterminate*, byssoid, *byssaceous*, penicillate, ciliate, fimbrillate, fimbriate, lacinulate, *lacinulose*, laciniate, pectinate, cirrhose, appendiculate; serrulate, serrate, denticulate, dentate, crenulate, crenate, erose,

*Words in italic are strictly or practically synonymous with those immediately preceding them.

eroded, *premorse*, lacerate, fissile, lobulate, lobed, *lobate*, incised, dissected, multifid, proliferous, merismoid.

C. Surface Markings

1, Rounded Markings.

a. Dots:

punctate, guttulate, guttate, maculate, *maculose*.

b. Depressions:

umbilicate, pitted, *foveate*, foveolate, alveolate, favose, lacunose, scrobiculate, porose, cribrose, latticed, *clathrate*.

c. Elevations:

papillate, *papillose*, pustulate, tuberculose, verruculose, verrucose, nodulose, colliculose, callose, bullate, intumescent, tumid, gibbous, strumose, subumbonate, *umbonulate*, umbonate, *bossed*.

2. Elongated Markings.

a. Irregular:

sinuous, flexuose, tortuous.

nebulose, marbled, rivulose, rugulose, rugose, *wrinkled*, labyrinthine, corrugated; rimulose, rimose.

b. Regular:

confluent, anastomosing, radiating, *radiant*, *radiate*, concentric, circinate; reticulate, *areolate*, tessellate, *tessellated;* plicatulate, plicate, virgate, vittate, costate; grooved, channeled, *canaliculate;* annulate, zonate, *zoned*, fasciated, sulcate, gyrose, *gyrate*.

D. Surface Coverings

1. Mucilage:

viscid, *glutinous*, glairy, slimy, *mucilaginous*, varnished, *vernicose*, *laccate*.

2. Powder:

pruinose, *glaucous*, dealbate, farinose, pulverulent, *pulveraceous*, granular.

3. Scales:

furfuraceous, chaffy, micaceous, squamulose, squamose, *scaly*, imbricate, *imbricated*, squarrulose, squarrose.

4. Hairs.

a. Kinds of hairs:

obsolete, evanescent, fugacious, persistent, appressed, innate, filamentous, arachnoid, flaccid, *lax*, fascicled, ramose.

b. Fine hairs:

glabrate, glabrescent, naked, *calvous*, hoary, *canescent*, *incanous*, *incanescent*, satiny, silky, *sericeous*, puberulent, pubescent, *downy*, velvety, *velutinous*.

c. Coarse hairs:

fibrillose, villose, pilose, *piliferous*, tomentose, *tomentous*, hirtellous, hirsute, shaggy, stupose, woolly, *lanate*, flocculose, floccose, *flocculent*, comose.

d. Stiff hairs:

hispidulous, setulose, barbulate, strigose, bearded, *barbed*, setose, *setigerous*, *setaceous*, *bristly*, hispid, echinate.

5. Sharp elevations:

scabridous, *scabrid*, scabrous, *scabrate*, *asperate*, *exasperate*, *muricate*, aculeolate, aculeate, spinose.

EXPERIMENT TO SHOW THAT THE ABSENCE OF LIGHT ALONE WILL PREVENT THE PROCESS OF PHOTOSYNTHESIS

By Cyrus A. King

In the *Botanical Gazette* of November, 1903, Bernice L. Haug discusses the question as to whether or not Detmer's experiment to show that light is essential for photosynthesis is reliable, and concludes that it is not.

By means of melted paraffine, she shows that the leaves of *Primula obconica*, even though the plant be in good sunlight, cannot produce starch when the stomata, which are found only on the under surface, are closed. This experiment shows also, as she has pointed out, that CO_2 is not readily diffused through the intercellular spaces of the leaf.

To determine the effect of the cork disks of Detmer's experiments, she cut a circular opening in the upper disk and then fastened the cork ring through the leaf to the disk below. This allowed the light to reach the leaf from above and, at the same time, held the disk below precisely as if the upper disk had been entire. No starch was formed under the cork ring, as one would expect; neither was starch formed in the central portion which was exposed to light. The absence of starch in the latter position must have been due to the fact that CO_2 was cut off by the close-fitting disk on the under surface.

In performing some physiological experiments two of the writer's students, Messrs. R. C. Paris and J. H. Tilley, tried this experiment, using narrow strips of black cloth about as coarse-meshed as cheese-cloth. Through the kindness of Mr. Olsen, Superintendent of the Central Park green houses, the experiments were tried there on several genera. The most pronounced results were obtained from the experiments on hydrangea and rose. The leaf in the accompanying photograph was removed from a hydrangea plant after it had been exposed to the sunlight during the entire day. The black cloth strips used were cut more than twice as long as the width of the leaves and one was wrapped around each leaf near the middle. One pin was used

to fasten the ends of the strips and another was inserted into the leaf to hold the cloth close to the leaf. The photograph, which was taken by Mr. Tilley shows that no starch was formed under the black strips.

Prevention of Photosynthesis in Hydrangea.

It seems perfectly obvious that this experiment is free from the inaccuracy of Detmer's experiment which was pointed out by Miss Haug. The cloth, in many places, was not in contact with the leaves. Even assuming that diffusion did not take place through the meshes of the cloth, there were certain parts under the strips which must have been in conditions essentially similar to those outside the strips, excepting, of course, the factor of light. Since light is the only factor eliminated by the cloth strips, the experiment proves that the absence of light alone will prevent photosynthesis.

DeWitt Clinton High School,
New York City.

BIRDS AND MISTLETOE: A CORRECTION

By S. B. Parish

In this journal for July, 1902 (2 : 105), the writer ventured to question whether the berries of the common mistletoe of his region, *Phoradendron flavescens*, were eaten by birds, and the seeds disseminated by their evacuations. This doubt was suggested by observing the undigested appearance of the seeds so abundantly adhering to twigs and other objects, at the season of ripening. Recently I happened on a note by the late Thomas Meehan, published in the *Botanical Gazette*, for February, 1882 (7 : 22), in which he expresses the same doubt, but founds it on a different premise. Mr. Meehan says :

"Birds do not seem to use the berries. As they are so viscid that the famous bird-lime is made from some species, it is probable that the very viscidity would prevent the free use of the beak in any attempt to use the seeds. But it is believed that by becoming attached to the feet or feathers of birds, the seeds are widely distributed, and that in this way the plant has all the advantage necessary for distribution in the struggle for life."

Nevertheless, birds do eat the berries of the mistletoe, and do distribute the seeds by their evacuations. The waxwing (*Ampelis cedrorum* Vieill.) and *Phainopepla* (*P. nitens* Swans.) are particularly fond of them. In North American Fauna (7: 113. 1863), Dr. A. K. Fisher makes the following record concerning the food of the *Phainopepla* in the Inyo County deserts: "A fine male was secured at the mouth of Surprise Cañon, April 23. Its stomach was filled with the berries of the mistletoe, which is a parasite on the mesquite. Several were seen at Resting Springs, about the middle of February, feeding on the same berries, which appear to be their principal food." The mistletoe here referred to must have been *Phoradendron Californicum* Nutt., which is common in the desert region on *Prosopis juliflora* DC. An ornithological friend informs me that he has shot the waxwing and the *Phainopepla* when they were so gorged with the berries that they extruded in handling.

A careful examination of the deposited seeds will show, in many cases, some sign that they have passed through the stomach of a bird — this is by no means always the case, and when the deposit is fresh, it is easily evident that very little of the viscid coating of the seed has been removed in the passage. It would appear that in digestion only the epidermis and little, if any, of the viscid matter, is utilized. This is a fortunate provision, for were this viscid coating digestible, the seeds would be freed from the very substance which serves to glue them to the bark on which they are to germinate. As it is, the passage through the stomach of the bird serves to remove the non-viscid epidermis, and leaves the sticky coating in a condition for performing its office.

San Bernardino, California.

SHORTER NOTES

The Name Melampodium. — In the Illustrated Flora, 3: 405, we read that *Melampodium*, Greek for black-foot, is without significance. No doubt, however, it refers to the black achenes of the common species, which might be thought to resemble little black feet. These achenes (of the ray florets) are not nearly filled by the ovule, constituting apparently moist chambers similar in function to the bladder-like pods of some Astragalines.

T. D. A. Cockerell.

Boulder, Colorado.

PROCEEDINGS OF THE CLUB

Wednesday, February 22, 1905

This meeting was held at the N. Y. Botanical Garden, Professor L. M. Underwood in the chair and twenty-one members present.

A letter was read from Dr. MacDougal explaining his inability to present his announced paper on "The Origin of Species by Mutation or Saltation."

A contribution to the knowledge of the local flora by Mrs. Livingston and Miss Crane was communicated by Dr. W. A. Murrill and read by Professor Underwood. The authors had worked on the fungi, and had identified 195 species in 82 genera and 17 families, all from Scarsdale, N. Y. The remainder of the program consisted of remarks on the genus *Lycopodium*, being some of the results of the joint labors of Professor F. E. Lloyd and Professor L. M. Underwood, which will soon be published in the *Bulletin*; Professor Lloyd spoke from a morphological standpoint and Professor Underwood from the systematic and general. Professor Lloyd called attention to the diagnostic differences which were brought out by the wet method used for the investigations, differences not distinguishable in dried material. The Lycopods fall naturally into two physiological groups as shown by their morphological characters, dependent upon habit — a radially symmetrical type for those species which are erect or pendent,

and a bilaterally symmetrical type, which may be purely physiological due to a twisting of leaves or stems or to the development of dimorphism in the leaves. Many interesting features were brought out with the aid of blackboard drawings.

Professor Underwood spoke of the number of new species brought to light by recent exploration and comparative study of material from the American tropics. The Lycopods, which in our latitude are inconspicuous and comparatively infrequent, in the tropics occasionally become weeds of large size and great beauty, growing especially in high altitudes; in fact most of the more interesting tropical Pteridophyta are found above the 5,000-foot level. Many specimens were exhibited, some of which admirably contrasted the old and the new methods of collecting herbarium material.

After considerable discussion, adjournment followed.

EDWARD W. BERRY,
Secretary.

TUESDAY, MARCH 14, 1905

The meeting was held at the American Museum of Natural History, President Rusby in the chair and twenty-five additional members present.

The Field Committee presented a formal report for 1904, which was received and filed.

Miss Helen L. Palliser, of Brooklyn, N. Y., was elected an active member.

The first paper on the scientific program was by Dr. N. L. Britton, and was entitled "A Botanical Cruise in the Bahamas."

The speaker had just returned from several weeks' exploration in the Bahamas and gave a general account of the trip.

The numerous islands — there are over 2,700 islands, keys, and projecting rocks — are all of the same general type in that they consist of coral limestone. The group is so scattered, extending for more than four degrees of latitude and somewhat farther from east to west, that there is considerable variation in temperature and rainfall.

A remarkable feature of the islands is the abundant and almost impenetrable thickets growing directly out of the rock; in fact,

there is very little soil except that known as "red land," which occurs in the bottom of sink-holes and locally in swales, and the "white land," formed from the crumbled rock either disintegrated in place or accumulated as sand dunes. These two formations represent practically all the tillable land of the islands. Owing to the porous nature of the material there are no known permanent fresh-water streams although there are a number of salt-water creeks of considerable size. Occasionally there are fresh-water ponds and marshes, mostly of small size. These very local ponds and marshes furnish many of the botanical novelties. Salt-water ponds which rise and fall with the tide are abundant and sometimes of large size.

The Bahamas are very recent geologically, the Bahamian uplift being placed not earlier than the late Tertiary, so that they offer excellent opportunities for the study of plant migration and evolution. The flora is of southern derivation, a large number of the known indigenous species being common to the near-by and older islands of Cuba and Hayti, while many other species are closely related to plants from these islands. The chief agents in the introduction and distribution of the plant population are migratory birds, supplemented by winds and ocean currents. Notwithstanding the geologically short period that the Bahamas have been above the sea, they have witnessed the evolution of numerous species, there being many endemic species known and many more which will be made known as the result of the recent explorations. Many of these, it is believed, will prove to be examples of rapid evolution (mutation).

Dr. Britton's observations were followed by remarks on "Collecting Algae in the Bahamas," by Dr. Marshall A. Howe. The shores of the islands were said to offer a considerable variety of physical conditions and to have a marine flora which is on the whole varied and rich, though apparently less so than that of the Florida Keys. The shore-lines are usually rocky, but there are often stretches of white sand which are nearly destitute of algae. The tide rises and falls ordinarily from one to four feet, but the withering effect of the sunshine is such that few species are found in the strictly littoral zone except under shelving rocks

or where the shore is subject to an almost continuous spraying from the waves. A deeply shaded shelf under a remarkable rock overhang on the Cave Cays of the Exuma Chain furnished some of the most interesting algae obtained on the recent expedition. The so-called creeks constitute good collecting grounds, especially if well exposed to tidal currents, and the roots of the red mangrove, which commonly borders such, always harbor algae of interest, particularly when standing in water that is three feet or more deep at low tide. Nearly all the larger islands have brackish ponds which have a peculiar flora, varying in character with the salinity of the water. Hundreds of square miles in the Bahamian region are occupied by the "banks," on which the water is very shallow, mostly from five to twenty feet deep; these banks often consist of clean white sand with little visible organic life, yet in many places are found, more or less abundantly, representatives of such genera as *Penicillus*, *Rhipocephalus* and *Udotea*, growing directly out of the sand, and *Microdictyon*, *Gymnoserus*, *Wurdemannia*, *Laurencia*, *Chondria*, *Herposiphonia* and others attached to sponges, corals, sea-fans, etc. In the winter and spring months, at least, very little is found washed ashore except species of *Sargassum* and their epiphytes.

The speaker remarked upon the desirability of extensive dredging operations in order to complete our knowledge of the marine flora of the Bahamian archipelago. A few characteristic specimens of Bahamian marine algae were exhibited. Special attention was directed to four species of *Penicillus*, viz., *P. capitatus*, *P. dumetosus*, *P. Lamourouxii*, and the recently described *Penicillus pyriformis*. *Rhipocephalus Phoenix* and *R. oblongus*, and various species of *Udotea*, *Avrainvillea* and *Halimeda* were also discussed.

Mrs. Britton, who accompanied the expedition, spoke more particularly of the flora of the island of New Providence, where she spent the time collecting, while the other members of the party were cruising. Several exceedingly fine photographs of the local scenery were exhibited.

Edward W. Berry,
Secretary.

NEWS ITEMS

Mr. O. F. Cook, of the United States Department of Agriculture, is in Guatemala, working upon various botanical problems of an economic character.

Mr. John F. Cowell, director of the Botanic Garden at Buffalo, N. Y., returned in the latter part of March from a collecting expedition to Panama.

Professor A. D. Selby, botanist of the Ohio Agricultural Experiment Station, Wooster, Ohio, returned early in April from a several months' visit to Europe.

Professor E. C. Jeffrey, of Harvard University, has been awarded from the Elizabeth Thompson Science Fund a grant of $200 "for the study of cupressineous conifers."

Dr. D. T. MacDougal, accompanied by Mr. G. G. Copp, left New York on March 10 to continue his studies of desert vegetation in the lower part of the valley of the Colorado River. He is expected to return late in April.

Colonel Nicolas Pike, a veteran naturalist, known to botanists chiefly by his collections of marine algae in the vicinity of New York, in Portugal, and in Mauritius, died in New York City, on April 11 at the age of eighty-seven years. *Pikea*, a Californian genus of red algae, was named in his honor by Harvey in 1853.

Volume 9 of the Contributions from the United States National Herbarium is an alphabetical annotated list of "The Useful Plants of the Island of Guam, with an introductory account of the natural history of the island, of the character and history of its people, and of their agriculture," written by William Edwin Safford. The volume is well illustrated and contains much of general interest.

Professor Francis E. Lloyd, of the Teachers College, Columbia University, has been awarded a grant of $500 by the Carnegie Institution to further his studies of stomatal action and transpiration in desert plants. He will spend the summer at the Desert

Botanical Laboratory of the Carnegie Institution at Tucson, Arizona, where he will continue the researches which he began there during the summer of 1904.

Popular interest in the study of American trees will be stimulated by the recently published "Manual of the Trees of North America (exclusive of Mexico)" by Charles Sprague Sargent, director of the Arnold Arboretum of Harvard University. The descriptions are accompanied by text-figures. A recent work of more general scope but with special reference to the native and cultivated trees of Great Britain is entitled "Trees: A Handbook of Forest Botany for the Woodlands and the Laboratory" and is written by Professor H. Marshall Ward, of Cambridge University. This is in two small octavo volumes and forms a part of the Cambridge Biological Series.

Under the patronage of the Caroline and Olivia Phelps Stokes Fund of the New York Botanical Garden, the Wild Flower Preservation Society of America has printed on cloth (10 × 12 in.) numerous copies of the following notice: "The Gathering of Wild Flowers and Ferns and the Cutting or Injuring of Any Tree or Shrub, or the Starting of Fires on these Premises, is Strictly Forbidden under Penalty of the Law." Any one desiring to make use of such notices will be supplied with them *gratis* on application to Mrs. N. L. Britton, Secretary of the Wild Flower Preservation Society of America, New York Botanical Garden, Bronx Park, New York City.

An experiment is being made at the New York Botanical Garden in the direction of active coöperation with the nature-study work of the public schools of New York City, the experiment being begun with the children of the "4 B" grade of the Borough of the Bronx. The course consists of three illustrated lectures, supplemented by demonstrations in the museums and greenhouses, and also out of doors, with the cultivated and native plants of the Garden. The first lecture of the series has been given by Dr. Marshall A. Howe, assistant curator; the second will be given by Mr. George V. Nash, head gardener, and the third by Dr. N. L. Britton, director-in-chief, other members of

the Garden staff assisting in the demonstrations. The lectures are delivered to groups of 700 to 800 children, who are afterwards arranged in squads of 40 or 50 for the demonstrations.

Professor Hugo de Vries, whose visit to America last year was such a genuine pleasure to all who met him, has just published a volume of 438 pages on his impressions of America under the title "Naar Californië" illustrated with numerous halftones. He includes chapters on the land and people, fruit culture, new varieties of fruit (with an account of two visits to Luther Burbank), irrigation, and the mountains and flora, ending with "Persoonlijke Herinneringen," giving account of his landing at New York, the commencement exercises at Columbia University, where he received the degree of Doctor of Science, his journey to California by the way of the Desert Laboratory at Tucson, and his return by the northern route including a stop at Chicago where he made the convocation address and received a second honorary doctorate at the University of Chicago. The work is full of botanical observations, as might be expected by those who know its writer personally.

In Bulletin no. 71 of the Bureau of Plant Industry, entitled "Soil Inoculation for Legumes," Dr. George T. Moore brings to the attention of the public another triumph of modern botanical science in its relation to agriculture. It has long been known that certain bacterial organisms living in the roots of leguminous plants and commonly causing tubercles upon them have the power of fixing free nitrogen, which is later taken advantage of by the host plants. Leguminous plants with root-tubercles are not only, as a rule, especially in a sterile soil, much more vigorous than those that are destitute of them, but the soil upon which they grow and decay is thereby enriched in nitrogenous materials as well as in the carbon compounds. Dr. Moore and his associates in the Bureau of Plant Industry have now perfected an inexpensive method of inoculating the soil with the proper microörganism. More than 12,000 tests have been made by practical farmers upon various leguminous crops and in nearly all the states of the Union, and the reports indicate a distinct

success for the method. The processes have been patented by the Department of Agriculture in the name of Dr. Moore in order to protect them for the use of the public.

Invitations and preliminary programs for the International Botanical Congress, meeting in Vienna, June 11–18, 1905, have been distributed. A four weeks' excursion to Illyria has been arranged to take place before the meeting of the Congress, and after the Congress are scheduled excursions to the Austrian coast, to the eastern Alps, and to the Lower Austrian mountains and the valley of the Danube. Shorter excursions in the neighborhood of Vienna have been arranged for the week of the Congress. In addition to the discussion of the nomenclature question, which is to be made a special feature of the convention, papers bearing upon various aspects of botany are to be read, and there will be an exhibition comprising three sections, as follows: (1) Historical, (2) Modern Appliances for Research and Instruction, (3) Horticultural. The American delegates, elected and, according to the rules of Congress, entitled to vote in the deliberations upon the nomenclature question, are, so far as we have learned, the following: Members of the International Nomenclature Commission, *N. L. Britton*, *E. L. Greene*, *B. L. Robinson*, *J. D. Smith*: Delegates from Section G, American Association for the Advancement of Science, *C. R. Barnes*, *H. C. Cowles*, *C. L. Shear*; from the Botanical Society of America, *J. C. Arthur*; from the Society for Plant Morphology and Physiology, *W. G. Farlow*; from U. S. Department of Agriculture, *A. F. Woods*; from the Torrey Botanical Club, *N. L. Britton*, *L. M. Underwood*; from the New York Academy of Sciences, *L. M. Underwood*; from the New York Botanical Garden, *J. H. Barnhart*; the American Academy of Arts and Sciences, the New England Botanical Club, the Boston Society of Natural History, and the Vermont Botanical Club will be represented by *B. L. Robinson*.

The program of the spring lectures at the New York Botanical Garden, to be delivered in the lecture hall of the museum building, Bronx Park, on Saturday afternoons, at 4:30 o'clock, is as follows:

April 29, "The Indian and his Uses for Plants," by Mr. Frederick V. Coville ; May 6, "The Pines and their Life History," by Professor Francis E. Lloyd ; May 13, "Botanical Aspects of the Deserts of Arizona, California, Sonora and Baja California," by Dr. D. T. MacDougal ; May 20, "The Coralline Seaweeds," by Dr. Marshall A. Howe ; May 27, "Cuba," by Dr. W. A. Murrill ; June 3, "Vegetable Poisons and their Strange Uses," by Dr. H. H. Rusby.

Mr. Harlan Harvey York, who for the past two years has been an assistant in botany in the Ohio State University at Columbus, has been appointed fellow in botany in Columbia University for the year 1905–'06. Mr. York received the degree of B.S. from De Pauw University in 1903.

Vol. 5 No. 5

TORREYA

May, 1905

THE CLASSIFICATION OF LICHENS

By Albert Schneider

Systematists have for a long time awaited the coming of the man with convictions sufficiently strong and insight sufficiently keen to produce order out of the long existing lichen chaos. Individual workers have not been wanting who were ready and willing to propose temporary makeshift systems of classification, which in the light of further scientific research proved inadequate and untenable. Only within very recent years has our knowledge of this group of plants become sufficiently advanced and complete to make possible an attempt at a natural system of classification, or at least a system sufficiently concise to give it equal rank with the systems of other comprehensive plant groups. This was made possible by the epoch-making observations and researches of Schwendener, Bornet, Zukal, Reinke and others. In the Lieferungen of Engler and Prantl's Pflanzenfamilien, devoted to lichens, we have perhaps the first more complete summary of modern lichenology and the first effort at formulating a natural system in accord with recent research. Fünfstück's exposition and discussion of general lichenology in Lieferung 180 is complete, concise and quite impartial. This masterpiece of lichenological literature appeared in 1898 and will remain the standard authority for some years to come. An English translation with annotations and additions issued as a separate volume would prove of great value to English students of lichenology and it is to be hoped that some one will undertake this task at an early date.

The only number (Lieferung) thus far issued on the classification of lichens, by A. Zahlbruckner, did not appear until 1903. While the lichens are treated separately, both by Fünfstück and

[Vol. 5, No. 4, of Torreya, comprising pages 55–78, was issued April 27, 1905.]

Zahlbruckner, they nevertheless place them with fungi, parasitically associated with algae. This is all the more remarkable since Fünfstück very concisely sets forth those morphological, physiological and chemical characteristics of lichens, which clearly indicate their autonomous nature. He refuses to look upon the relationship of fungus and alga as mutually beneficial, and designates it as a special or peculiar form of parasitism ("eine besondere Art von Parasitismus"). It is furthermore a misapprehension of the expression "mutualistic symbiosis" to interpret it as meaning that the several symbionts are equally benefited. The term simply implies that the several symbiotic components are benefited (which is frankly admitted by Fünfstück) but that one may receive the greater return favor or benefit. There are some botanists who refuse to recognize in this wonderful biological relationship anything more than ordinary parasitism. Such a deduction is possible only when the components or symbionts are considered separately and not in their mutual relationship. For example, in like manner it is possible to reach the conclusion that the domestic animal is injuriously affected through the influence of man, or that civilized man himself is merely a parasitized or degenerate form of the ignorant savage. To speak of the algal (gonidial) symbiont as imprisoned and parasitized is as irrational as to speak of the imprisoned and parasitized horse or cow. It is very true, man uses the milk, the hide, the hair, the teeth, the meat, the bones, the hoof, in fact every part of the animal. It does look like a clear case of the most pronounced one-sided parasitism, but the aspect is changed markedly as soon as we consider both animals, the cow and the man, in their mutual relationship. Had it not been for man, the cow would perhaps not exist at all; as it is, millions of these animals enjoy a life of luxury as compared with the life they would be compelled to lead as independent unparasitized wild animals. Who can then say that the relationship is not mutualistic? By analogy the same argument applies to the alga and fungus in the lichen-group, only here we have a true symbiotic relationship. It would be a waste of effort again to present the familiar arguments in favor of lichen autonomy or lichen mutualism. The interested reader is referred to

the work of Fünfstück. I wish to refer to one point only. While it is generally admitted that the lichen components or symbionts may develop and exist independently under artificial conditions, at least up to a certain stage, there is no evidence that such is the case in nature. The statement has been made that the algal symbiont may escape from the thallus and vegetate independently on bark, etc., but it lacks proof. Even though that were the case, the fungal symbiont does not exist independently in nature and hence a lichen is an impossibility without the mutualistic association of alga and fungus. No one has yet succeeded in forming a lichen by associating a true alga (*Cystococcus*) with a true ascomycetous fungus. If this were possible we might reasonably expect spontaneously synthetic lichen formations in nature, which is certainly not the case. Lichens invariably arise from preëxisting lichens. Some authorities state that a fungus may attack nostoc colonies and transform them into collematous lichens but this statement requires verification.

Therefore, without entering into what would merely be useless discussion and repetition, it would appear to the writer that the most plausible and reasonable attitude to take toward lichen classification is to consider them as a distinct class. This is the conclusion reached after a perusal of the more important literature on the subject and a rather careful study of the morphology (gross and minute) and ecology of the more important representatives of this very interesting group of plants.

While the system proposed by Zahlbruckner is undoubtedly the best in existence, there are nevertheless several changes which would appear to be desirable. Fünfstück calls attention to the fact that our knowledge of certain lichen structures, organs, functions, etc., etc., is as yet not well understood owing to the fact that our knowledge of lichen evolution and lichen ecology is very incomplete. This accounts for our indefinite and variable terminology. With few exceptions we know practically nothing of the delimitations of species. While this applies especially to the lower forms, it applies also to some of the higher forms, as, for example, *Usnea barbata*, many of the Parmelias, some of the Cladonias, and others. In consideration of these con-

ditions, it is highly absurd for lichen systematists to enter into lengthy and detailed descriptions of species, varieties, subvarieties and even forms. As Fünfstück states, "Bei der ausserordentlich schwankenden Abgrenzung der Arten bei den verschiedenen Autoren ist es geradezu unmöglich eine sichere Orientierung über die Artenzahl zu gewinnen." His further statement that there are in all probability thus far not more than 4,000 good species known harmonizes with the estimates of several other lichenologists. Contrasting this very fair estimate with the fact that some 20,000 species, varieties and forms are actually described it is very evident that there lies an enormous task before those who will attempt to balance this difference. Special care will be necessary in the study and revision of the lower groups. For example, over 100 species, varieties and forms of *Verrucaria* are described. It is more than likely that there are not half that number of good species. This applies also to the genus *Arthonia* as well as to other genera. It may be advisable in some instances to subdivide certain genera. It would appear that Zahlbruckner gives too much systematic importance to the thecial characters, which is however to be expected from one who recognizes the lichens as modified fungi. Too much systematic importance is ascribed to the pycnoconidial apparatus (spermogonia), since the function and occurrence of this organ or structure is but little understood. In brief the subject of lichen classification, as understood at the present time may be summarized as follows :

1. While some authorities are satisfied that lichens deserve to be recognized as an autonomous group, others are not ready to admit this. This difference of opinion does not cause any serious confusion in the conception of lichen groups and species.

2. There is great confusion with regard to the delimitation of lichen species. The number of good species is in all probability less than one fifth of those actually described.

3. The system of classification proposed by Zahlbruckner is excellent and should be generally adopted. This would very materially facilitate the work of studying the various groups more carefully, thus perfecting our knowledge of lichens more and more and making it possible to form a more perfect system in the near future.

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THE COURSE OF THE POLLEN TUBE IN HOUSTONIA: A PRELIMINARY NOTE

By Francis E. Lloyd

In 1902* I announced that in certain Rubiaceae, namely in the genus *Houstonia*, the ovule is not supplied with an integument, realizing the "*nucellus nudus*" of Schleiden, a condition supposed erroneously by him to obtain in the Rubiaceae in general. At present *Houstonia* is the only genus of this family in which this peculiar and unexpected condition has been announced to occur, although it has recently been found by me that other genera closely allied to *Houstonia* are similar to it in this regard. In the paper above cited it was also shown that the course of the pollen tube in other Rubiaceous genera, namely *Richardsonia* and *Diodia*, is also of especial interest. In *Richardsonia pilosa*, the species studied, the pollen tube takes an intercellular course, the path being constant in its direction. This is true also of *Diodia teres*. *D. Virginiana*, on the other hand, offers a contrast in that for a part of the path the tube moves freely in the ovarian cavity, though in a direction in general similar to that in the other species studied. The significance of this remarkable dissimilarity I have discussed elsewhere† but it may be added that similar relations have been observed by Longo in an entirely different group of plants, the Cucurbitaceae.

The fact that the pollen tube in some of the Rubiaceae is intercellular in its mode of growth, coupled with the further fact that in *Houstonia* no micropyle is present, a condition due of course to the absence of the integument, led me to the belief that the course of the pollen tube in the latter also would be found upon examination to be intercellular. This hypothesis was strengthened again by the similarity of the topography of the ovary in *Richardsonia*, *Diodia*, and *Houstonia*, apart from the placental structure, together with the disposition of the ovules in the last named.

* Lloyd, F. E. The Comparative Embryology of the Rubiaceae. Memoirs of the Torrey Botanical Club, 8 : 27–112. *pl. 5–15*. 15 F 1902.

† The Pollen Tube in the Cucurbitaceae and Rubiaceae. Torreya, 4 : 86–91. Je 1904. Pertinent literature is here cited.

Accordingly, at my suggestion, Mr. Chester A. Mathewson undertook an examination of a lot of material which I had previously collected for the purpose, and has been able to follow the pollen tube from the papillae to the funicle of the ovule. A full account of Mr. Mathewson's observations will appear later when the work is completed. At the present it is of interest to point out that the expectation entertained by me has proved correct and that the course of the pollen tube is throughout intercellular. Through the stylar tissue and the stylar elements of the ovarian partition the tube moves precisely as described for *Richardsonia* and *Diodia*. At the lower edge of the stylar tissue the tube encounters the basal portion of the dissepiment. It then turns abruptly, pursuing a path at right angles, roughly speaking, to its previous course, but for only a short distance. It may turn out that this is not invariably the case, though it is certainly the rule, in which event the tube would penetrate into the tissue of the basal element of the partition directly. Before emerging into the ovule, as it would if it kept on in the direction described, namely at right angles to its stylar course, it turns again abruptly, penetrating from one to several layers deep, gradually turning so as to pursue a path parallel to the axis of the placental stalk. Through the parenchymatous mass of the placenta the path is less direct, but in the main leads with little irregularity to one or another of the ovules. On reaching one of these, the tube may emerge into the sinus between the ovule and the placenta and then repenetrate the ovule laterally; or, as I believe to be the more usual, the tube enters the ovule through the funicle. From this point it goes more or less obliquely and irregularly toward the egg pole of the embryo-sac, at least in the few cases in which the course has been followed. It will be of further interest to see if in any instances the course is through the chalazal tissues.

A further question presents itself. As is well known, *Houstonia* produces a goodly number of ovules in each of the two locules. These are distributed upon the knob-shaped placentae, which originate in a manner similar to the single ovules of the Galieae and in a similar position. It seems not unlikely that these ovules develop centrifugally, the ones placed nearest the

stylar partition maturing the embryo-sac somewhat earlier than those next in position, and these in turn earlier than the following and so on. If this should turn out to be the case, certain ovules should be first prepared to attract the entering pollen tubes on the theory that the direction of these is determined by the presence of a stimulant which works chemotactically upon them, a view advanced by Molisch and supported by my studies of the Rubiaceae upon physiological-anatomical grounds. This inference would have to be made in view of the fact that there appears to be no special conductive tissue within the placental parenchyma for the guidance of the tubes which, as above pointed out, travel through it.

The facts thus made out serve to emphasize the contention advanced by Murbeck, Longo and myself, to the effect that the phenomena observed in the behavior of the pollen tube in the various plants examined by us have a physiological meaning only. This view is opposed to that which was previously advanced by Treub and by Nawaschin, who ascribed rather a phylogenetic significance to the matter. The fact that in widely different families, including the Rosaceae, Cucurbitaceae, and Rubiaceae, as well as the so-called primitive dicotyledons, similar behaviors of the pollen tube have been observed, loosens the grasp of those who hope upon these grounds to construct a phylogeny of plants of even the most general kind.

CONTRIBUTIONS TO THE RECORDED FUNGUS AND SLIME-MOULD FLORA OF LONG ISLAND

By G. A. Reichling

A list is given below, comprising a few additions to Dr. Jelliffe's Flora of Long Island in the fungi and myxomycetes. The specimens have been collected for the most part at Jamaica and Flushing during last summer. Flushing seems to have a particularly rich and interesting flora.

In the list the nomenclature of Macbride is employed for the myxomycetes. The localities are given with the names.

MYXOMYCETES

Tilmadoche polycephala (Schw.) Macbr. Near Sheepshead Bay.
Mucilago spongiosa (Leyss.) Morg. Flushing.
Comatricha laxa Rost. Flushing.
Oligonema nitens (Lib.) Rost. Flushing.

FUNGI

PHYCOMYCETES

Empusa Muscae Cohn. Brooklyn.

ASCOMYCETES

Guignardia Bidwellii (Ell.) V. & R. Near St. Albans.

BASIDIOMYCETES

Amanitopsis vaginata (Bull.) Roze. Near St. Albans.
Omphalia campanella Batsch. Near Flushing.
Russula atropurpurea Peck. Near Flushing.
Pluteus cervinus (Schäff.) Fr. Brooklyn, Flushing.
Galera tenera Schäff. Vandeveer Park, Flatbush.
Pholiota adiposa Fr. Brooklyn.
Psilocybe foenisecii Pers. Brooklyn.
Hypholoma capnoides Fr. Forest Park, Jamaica.
Hypholoma sublateritium Schw. Rockaway Junction.
Panaeolus campanulatus L. Brooklyn.
Strobilomyces floccopus Vahl. Flushing.
Daedalea confragosa (Bolt.) Pers. Flushing, Jamaica, etc., common.
Ganoderma Tsugae Murrill. Jamaica, Rockaway Junction.
Polyporus picipes Fr. Forest Park, Jamaica.

The writer wishes to acknowledge the kindness of Prof. T. H. Macbride, of the State University of Iowa, for determining a slime-mould (*Comatricha laxa* Rost.) and verifying two other determinations. The specimens of the slime-moulds were meager and in a particularly bad condition making the determination a matter of difficulty. *Strobilomyces floccopus* Vahl agrees with the description given in Peck's *Boleti* and Saccardo's *Sylloge*, but it is probable that the species is not distinct from *S. strobilaceus* Berk., in

the United States at least. This opinion is expressed by Professor Peck in *Boleti*, p. 159. Nearly all the fungi and slime moulds given are common species and have probably been collected by others who have studied the mycologic flora of our island.

127 Putnam Avenue,
Brooklyn, New York.

SHORTER NOTES

Three Cotyledons in Juglans. — A whorl of three cotyledons has been recorded in a great variety of dicotyledons. Braun (1869) mentions a considerable number of such cases, Masters (1869) records nine different genera in which this abnormality occurs, and many other references are scattered through botanical literature.

During the last winter I ran across a nut of the so-called English walnut (*Juglans regia* L.) which was perfectly three-valved and which contained an embryo with three, apparently normal, cotyledons.

Edward W. Berry.

Passaic, New Jersey.

A new Rosellinia from Nicaragua — **Rosellinia Bakeri** sp. nov. Perithecia scattered or collected in groups of 3–6, touching each other but not confluent, or in short series of 3 or 4, globose, slightly roughened, except the small, papilliform, black ostiolum, base slightly sunk in the wood, about 0.5 mm. in diameter: asci cylindrical, short-stipitate, spore-bearing part 55–65 μ × 7–8 μ: sporidia uniseriate, acutely elliptical, more so at one end, subinaequilateral and slightly compressed, 8–10 μ × 4–4.5 μ or 3–3.5 μ when viewed edgewise.

On *Urera*, Chinandega, Nicaragua, December, 1903 (*C. F. Baker, 3990*).

R. compressa E. & D. has smaller perithecia and larger sporidia.

J. B. Ellis.

Newfield, New Jersey.

A much-named Fern — One ordinarily looks for carelessness of citation as a feature of the systematic (or unsystematic?) botany of the early years of the nineteenth century rather than of

the present period. Redescription of species and unwarranted changes in names, also, were characteristic of the writers of a century ago. But in these recent days we sometimes receive rude shocks from our German friends who occasionally display unexpected unfamiliarity with standard American literature as well as unwarranted laxity of principles in the matter of shifting plant names, all resulting in unnecessary synonymy.

A little Bolivian fern collected by Bang was described just a decade ago by Mrs. Britton as *Acrostichum Moorei*, following the then current interpretation of *Acrostichum* in the wide sense in which it is still employed at Kew. This appeared in our MEMOIRS which ought to be accessible to German writers on ferns, if not in the original then surely in at least two reviews that have appeared in standard German publications, *viz.:* Just's *Bot. Jahresbericht*, **23**: 433. 1897, and *Hedwigia*, **34**: (109). 1895, the latter also "redigiert von Prof. Georg Hieronymus!", and both of which mention this species by name, author, collector, and type locality!

In spite of this, the fern was destined to be redescribed under two new generic and two new specific names, and after American intervention had called attention to the error, and the original specific name had been restored, the latest emanation from Berlin overlooks all of this citation, redescription and restoration and boldly places the plant in its fourth (and correct!) genus but with its third (and most recent) specific name! And all this is German systematic (?) botany of the twentieth century instead of the nineteenth, where it would not so much surprise us!

The following corrected synonymy gives the details of the story:

Microstaphyla Moorei (E. G. Britton)

Acrostichum Moorei E. G. Britton, Mem. Torrey Club, **4**: 273. 1895. (Type from Bolivia, *Bang 558*).

Rhipidopteris Rushyi Christ, Farnkr. der Erde, 46. 1897. (Type from Bolivia, *Bang 558!*).

Elaphoglossum Bangii Christ, Monog. Elaphoglossum, 99. 1899. (Type from Bolivia, *Bang 558!*).

Elaphoglossum (*Microstaphyla*) *Bangii* Christ, Bull. Herb. Boiss. II. **1**: 588. 1901.

Elaphoglossum Moorei (E. G. Britton) Christ, Bull. Herb. Boiss. II. 3: 148. 1903.

Microstaphyla Bangii (Christ) Hieron. Bot. Jahrb. Engler, 34: 539. 1904.

It is to be hoped that after this tedious experience the poor fern will rest in peace!

LUCIEN M. UNDERWOOD.

COLUMBIA UNIVERSITY,
20 April, 1905.

REVIEWS

Species and Varieties; Their Origin by Mutation*

To write two similarly comprehensive works upon the same subject, treated from the same point of view, and not displace the first by the second, nor make the second superfluous is a problem of no small magnitude. In presenting a second work on the mutation theory, Professor Hugo de Vries has solved this problem in a most admirable fashion.

"Species and Varieties: Their Origin by Mutation" is in no sense a rendering into English, of "Die Mutationstheorie," and is much more valuable in many respects than such translation could be made. The author was doubtless greatly aided in the successful solution of the problem by the difference of origin of the two works. "Die Mutationstheorie" is primarily a detailed exposition of the results of research, and was addressed to scientists who would appreciate — nay, demand — all the evidence on which are based the far-reaching generalizations involved in the theory of mutation. "Species and Varieties," on the other hand, having grown out of a series of lectures delivered by the author, before the students of a university, assumes in consequence a much less rigid scientific aspect, becoming by necessity intelligible to a wider circle of readers. A technical scientific work may be pored over by those immediately interested in its subject matter until all its important details are comprehended; but the successful lecturer must make himself instantly intelligible to his audience.

* **De Vries, H.** Species and Varieties: Their Origin by Mutation. Edited by D. T. MacDougal. 8vo, pp. xii + 847. Chicago: The Open Court Publishing Co. F 1905.

The unusual simplicity, directness and beauty of the language used, the purity of its Anglo-Saxon English, in connection with the largeness of its theme, renders the new book at once a classic, and although "Die Mutationstheorie" must always stand as the *epoch-making* work, it is "Species and Varieties" that will be found most frequently back to back with Darwin's "Origin of Species" on the shelves of the general libraries, and that will make the name of de Vries known as Darwin's is to every man and woman of intelligence regardless of vocation.

As compared with "Die Mutationstheorie," the new book shows many evidences that the author has profited by the discussions which have been aroused by that work, and he has very carefully defined his position in regard to points in which he has been misconstrued. Ardent Darwinians immediately attacked the new theory because it appeared to be offered as a substitute for the theory of "Natural Selection." In evident response to these attacks, the author has joined his views in a masterful way to those of Darwin, showing that there is no conflict, and making the reader feel that the theory of mutation was the next step logically, as it certainly has been the next important step historically in the development of a satisfactory conception of the origin of specific and varietal differences.

The basis of the author's views is the conception of character-units as the ultimate bearers of heredity, a conception that, though seemingly too simple and inelastic to be entirely satisfying to the physiologist, has been brought into the greatest prominence and furnished support amounting at least to partial demonstration in the work of Mendel and of those who have since confirmed and extended Mendel's results, in the renaissance and extension of which Professor de Vries himself had such prominent part.

Recognizing as did Darwin that by far the greater part of our knowledge of evolutionary processes is necessarily based upon the results of economic practice, Professor de Vries has made a careful experimental analysis of horticultural and agricultural processes, and it is this part of his work which commends itself especially to the thinking scientist.

By showing that the years devoted by the horticulturist to "fixing" new garden varieties have for their purpose the elimination of the effects of "vicinism," *i. e.*, the chance crosses with neighboring species or varieties, and by distinguishing between ever-sporting varieties and those which possess only an ordinary degree of fluctuating variability, the way has been cleared for a proper appreciation of the true relations between the garden and nature. It is doubtful however whether physiologists will agree that the cases of "double adaptations" in nature, and the relation of juvenile to adult leaf-characters, are to be classed with the ever-sporting varieties of the garden, for in the former cases definite laws of occurrence of the alternative characters are discernible, while in the ever-sporting varieties no such laws have yet been detected and they seem in many instances to be closely related to fluctuating variations.

The book is divided into six sections. After an introductory lecture on the theories of evolution and methods of investigation, the conception of elementary species as distinct from systematic species is developed, and a definite and distinctive significance is attached to the term, "variety," which is quite different from its usually loose usage for any assemblage of forms less extensive than the systematic species. A variety as conceived by de Vries is not qualitatively like a species, being distinguished from the species to which it belongs and from which it has been derived in the possession or lack of some single definite character, or two or three single characters at most while species differ from one another in almost every character. The several different kinds of varieties, progressive, retrogressive, degressive, and ever-sporting, are thoroughly considered, along with the included subjects of latency and atavism.

The fifth section deals with mutations, the evening-primroses naturally having an important place, but the number of other fully authenticated cases described will doubtless give surprise to some readers who may have thought that the mutation theory rests only on the behavior of *Onagra Lamarckiana*.

The last section is devoted to individual and partial variability or "fluctuation" as it is called. This process, which has been

held by Wallace and the "Neo-Darwinians" as practically the only source of evolutionary changes, is held by Professor de Vries to have no effect whatever in giving rise to new specific and varietal distinctions, though it is of great importance both in nature and in culture, in that it allows a certain amount of adaptive change or amelioration within the species.

The editor professes to have changed as little as possible the original diction of the author, and for this the reader will be grateful both because it leaves unmodified the simple, genial flavor of the author's personality and because no material change is conceivable which would not have resulted in a more involved style. Some changes might have been introduced, however, which would have been distinct improvements, and it is to be hoped that in succeeding editions these changes will be made. Thus the description of the zygomorphic or bilateral flowers of *Digitalis* as "symmetrical" is using in an unusual though literally correct sense a word that has long been in use in descriptive botany with a totally different meaning. Another even less desirable practice of quite similar character is the interchangeable use of "retrogression" and "regression" for the mutative loss of a character. "Retrogression" was the term first applied by the author to this process and there is no reason why it should not be used exclusively in biological terminology in this very definite sense. "Regression" already has a distinctive significance in connection with "fluctuation" and is used in its proper sense in Section F. which is devoted to that subject. Much confusion will be avoided if in future editions "retrogression" be substituted for "regression" wherever the mutative loss of a character is intended. An added complication in this connection is found on page 221, where, presumably by a typographical error, "degressive evolution" is rendered "regressive evolution." A number of other typographical errors occur, but in most cases the context prevents misinterpretation. Aside from these the press-work leaves little to be desired.

The year 1904 will always be memorable in the annals of American science because of the number of distinguished foreign scientists who visited this country during that summer. Of these

none was received with more genuine appreciation and honor than Professor de Vries. No more fitting memorial of his summer in America could have been left to his delighted hosts than this series of charming lectures on the most fundamental problems of biology, and one may safely predict that the work will further stimulate the interest that has awakened everywhere in experimental research in variation and heredity, the two fundamental processes of organic evolution.

George Harrison Shull.

Station for Experimental Evolution,
Cold Spring Harbor, New York,
April, 1905.

PROCEEDINGS OF THE CLUB

Wednesday, March 29, 1905

This meeting was held at the New York Botanical Garden, Vice-President Underwood in the chair and twenty-three additional members present.

Mrs. L. Schöney, of New York, and Miss Caroline S. Romer, of Newark, were elected to membership. The scientific program consisted of "Remarks on Californian Conifers" by Le Roy Abrams.

The conifers of California have been of extreme interest to the botanical world from the time that that region was first explored. Nowhere do we find such unique trees as the sequoias, and nowhere is there such a profusion of genera and species. Nearly two thirds of the species of the United States, and all but two of the genera occur within the state. The distribution of these species, especially of some of the more local ones, is of considerable interest, and it was upon this subject that Mr. Abrams chiefly dwelt.

By far the greater number of species occur in the extreme northern part of the state. Here, within a radius scarcely exceeding one hundred miles no less than eleven genera and at least thirty species may be met with. This great profusion is

due mainly to the fact that we have in this region a mingling of the typical Californian species with those of the Northwest.

Nearly all of the local species are confined to the coastal region. Some of these, such as *Pinus Torreyana*, *Abies venusta* and *Cupressus macrocarpa* are extremely local. This peculiar distribution along the coast is of great interest and suggests a field for investigation which is full of possibilities. Mr. Abrams was of the opinion that present climatic conditions together with the broken and unconnected mountains were no doubt largely responsible for the present status of distribution. He suggested that the great changes in land areas to which this region has been subjected during very recent geological time must have had much to do with shaping the destiny of the flora.

EDWARD W. BERRY,
Secretary.

TUESDAY, APRIL 11, 1905

The meeting was held at the American Museum of Natural History, President Rusby in the chair and twenty-two additional members present. Miss Mary Price and Dr. Grace E. Cooley, both of the Newark High School, were elected to membership. The paper of the evening was on "Some Edible Seaweeds" by Professor H. M. Richards.

After reference to the indirect importance of plankton organisms as a source of food for animal life in the sea, the speaker referred to those forms of algae which are used directly by man as food-stuffs. They were grouped roughly under four heads: blue-green, grass-green, brown, and red algae.

In the first group, specimens were shown of a form, which is according to good authority *Nostoc commune flagelliforme*. This becomes highly gelatinous when soaked in warm water and is used as a thickening or sauce. It is much prized by the Chinese. A Japanese form, "Su-zen-ji-nori," of more doubtful nature, but probably an *Aphanothece*, was also shown.

Among the grass-green forms, mention was made of various species of *Ulva* and *Enteromorpha*, which in dried form go under the name of "laver" in the British isles and "ao-nori" among the Japanese. Among the brown forms, only one of the Fucaceae

was mentioned as an article of food, namely *Durvillea utilis*, which is said to be eaten by the natives in certain parts of Chili.

The Laminaria forms, however, include a large number of edible species. *Alaria esculenta*, common both here and in Europe, was at one time eaten occasionally in the Occident. At the present time the Japanese and Chinese make great use of these forms, indeed, after fish, they constitute the chief article of export of the Hokkaido. They are exceedingly plentiful in that region and their collection and preparation for market is a thriving business.

In this connection, the report of Professor Miyabe and others was passed around and attention was called to the illustrations showing the mode of harvesting the seaweeds. The two most important species seem to be *Laminaria saccharina* (*Laminaria japonica*) and *Undaria pinnatifida* (perhaps identical with *Undaria distans* more recently separated by Miyabe and Okamura) which are known under the respective names of "Kombu" and "Wakame" by the Japanese. Many other forms are eaten however. After reference to the well-known examples "Irish moss" (*Chondrus crispus*) and "dulse," it was said that the two types most used are the delicate *Porphyra* forms and the more massive cartilaginous kinds such as various *Gigartina*, *Gelidium*, *Gloiopeltis* species. *Porphyra* has also been eaten by Europeans and is said to be used by the natives in parts of Alaska, but it is most highly prized by the Japanese and Chinese. Under the name of "Asakusa-nori" it is put up in neat tin boxes and largely sold in the Tokio markets. It is used by itself or for thickening, giving a very glutinous mixture with hot water. "Fu-nori," used chiefly as we use starch, is a mixture of species of *Gloiopeltis* and *Endotrichia*, and like all these forms is sold dried. The speaker referred to agar-agar, which on Wiesner's authority is said to come from different species in different regions. That of Ceylon is from *Gracilaria lichenoides*, that of Java from *Eucheuma spinosum*, while the Japanese variety is furnished by *Gelidium corneum* and *cartilagineum*, and *Gloiopeltis tenax*. Agar, in addition to its uses as a culture medium in bacteriological research, is said to be employed sometimes, as an adulterant in the jellies of commerce, where it may be recog-

nized by the siliceous frustules of diatoms, etc., from which it is never free. Other forms of Florideae are used as food-stuffs, attention being called to their figures in a Japanese popular work on the useful plants of Japan. In regard to the food value of algae it appears that many of them, especially the blue-green forms, contain a very high percentage of proteids, though not much else of value. The gelatinifying substances obtained from the red forms appear to be a substance called gelose, which is similar to, or identical with, the pectic substances so commonly found, either deposited in the middle lamellae of the cells of higher plants, or in the walls themselves. Mention was incidentally made of the use of seaweeds in the manufacture of iodine and soda-ash.

Dr. Rusby exhibited specimens of *Fucus vesiculosus* and an unnamed species of the same genus, which are used medicinally.

Dr. Howe spoke of dulse as an article of food and of its occurrence in the markets of New York.

After further discussion, adjournment followed.

L. H. Lighthipe,
Sec. pro tem.

NEWS ITEMS

Professor L. M. Underwood sailed for Antwerp on May 20. He will spend a large part of the summer at Berlin and Kew.

Mr. L. J. K. Brace, of Nassau, New Providence, Bahamas, is making collections in the western part of the Great Bahama for the New York Botanical Garden.

The fifth annual exhibition of the Horticultural Society of New York was held at the New York Botanical Garden on May 10 and 11. Prizes amounting to about $500 were offered.

Dr. John Hendley Barnhart sailed for Europe on May 13 to attend the International Botanical Congress at Vienna. During the two or three months of his absence, the editor of Torreya will have charge of editorial matters relating to the *Bulletin of the Torrey Botanical Club.*

The first Walker prize, of $75, has been awarded by the Boston Society of Natural History to Dr. W. B. MacCallum, of the

department of botany of the University of Chicago, the subject of his paper being "Physiological Analysis of the Phenomena of Regeneration of Plants."

Mr. Le Roy Abrams, who has held the University fellowship in botany in Columbia University during the present scholastic year, has been appointed assistant curator in the Division of Plants of the United States National Museum, and will take up the duties of his new position on October 1.

Dr. F. E. Clements, assistant professor of botany in the University of Nebraska, has recently been promoted to be associate professor of plant physiology in that institution. Dr. F. D. Heald, adjunct professor of plant physiology, has been elected botanist of the Nebraska Agricultural Experiment Station and associate professor of botany in the University School of Agriculture.

The second edition of Britton's "Manual of the Flora of the Northern States and Canada" was published about the first of May. The stereotyped plates of the first edition have been revised where practicable and descriptions of over one hundred species have been added to the appendix. Artificial keys to the families of the angiosperms and to the genera of composites, prepared by Dr. Karl M. Wiegand of Cornell University, have also been added.

It is stated in *Science* that Professor D. H. Campbell of Stanford University will devote next year to an extensive trip through Europe, Africa, and Asia. He expects to attend the International Botanical Congress at Vienna and the meeting of the British Association at Cape Town. In the same issue of *Science*, it is announced that Professor Willis L. Jepson of the University of California will spend next year in Europe and in the tropics, gathering material for the botanical museum at Berkeley.

The second annual field symposium of botanists will be held during the week beginning July 3, 1905, at Ohio Pyle, a point on the Baltimore & Ohio Railroad in Fayette County, southwestern Pennsylvania, where arrangements have been made for the accommodation of the party. Information concerning details of the trip and the proposed program may be obtained from

either Mr. Joseph Crawford, 2824 Frankford Avenue, Philadelphia, representing the Philadelphia Botanical Club, from Dr. J. A. Shafer, New York Botanical Garden, Bronx Park, N. Y. City, representing the Torrey Botanical Club, or from Dr. J. N. Rose, U. S. National Museum, Washington, D. C., representing the Washington Botanical Club. The pleasant and profitable experiences gained by those who attended the first of these meetings, held at McCall's Ferry, Pennsylvania, in July of last year, give reason to believe that there will be a large attendance at Ohio Pyle. A detailed report of the proceedings at McCall's Ferry will be found in the February issue of the *Plant World*.

Vol. 5 No. 6

TORREYA

June, 1905

SOME PTELEA SEGREGATES

By Edward L. Greene

Ptelea Carolina sp. nov.

Shrub probably large, apparently glabrous or very nearly so in all its parts; red-brown twigs of the season slightly rugose: leaves large, on stout petioles 3 to 5 inches long; odd leaflet commonly 5 inches long and nearly 3 in breadth, of somewhat rhombic-ovate outline, cuneate at base, cuspidately pointed at apex but the cusp not acute, usually blunt and commonly even emarginate, the whole margin faintly crenate, upper face deep green, lower glaucous, lateral leaflets nearly one-third smaller, not strongly inequilateral: samaras small for the plant, hardly more than one-half inch in diameter, nearly orbicular, retuse at both ends, the body nearly central, round-oval, distinctly rugose, moderately punctate between the ridges; reticulation of wing not at all pronounced.

Mountains of North Carolina, along the French Broad River, in Madison Co., 2 August, 1880, *John Donnell Smith*; the copious type specimens all in his private herbarium. Readily distinguished from the common Virginian and northern *P. trifoliata* by the absence of all pubescence, and the small samaras, these being of only about one-third the dimensions and much less reticulate as to the narrow wing.

Ptelea obcordata sp. nov.

Shrub 10 feet high or more; twigs with red-brown bark finely rugulose and glabrous, as are all the parts of the shrub: leaves of a vivid green on both faces, scarcely paler beneath; odd leaflet 2 to 3.5 inches long, somewhat elliptic-lanceolate, merely acute, not taper-pointed, the margin faintly crenate, the lateral pair about one-third smaller, very inequilateral: samaras very large, some quite an inch long, round-obcordate, abruptly acute at base, the summit with a short sinus between the rounded

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lobes, the body of the samara plainly transverse-rugose and strongly and densely glandular-punctate between the ridges.

Vicinity of Eustis, Florida, June, 1894, *George V. Nash*, according to specimen in U. S. Herbarium. Unlike *P. trifoliata* by its narrow foliage glabrous even when young, and of the same hue on both faces. The samaras also have their marks as unlike those of the northern shrub.

Ptelea mesochora sp. nov.

Foliage of less than half the size of that of *P. trifoliata*, commonly about one-third as large, glabrous or nearly so, very pale and glaucous beneath; odd leaflet 2 or 3 inches long, rhombic-ovate, merely acute, not acuminate or even cuspidate, the laterals rather more than half as large, more or less inequilateral: samaras of the largest, commonly 1 inch long, round-obovate or even slightly obcordate, truncate or subcordate at base, the very broad wing apt to be full and wavy, strongly reticulate, the body oval, small in proportion, excentric, nearer the summit than the base, distinctly rugose, the intervals rather closely punctate.

Of the region of the upper Mississippi valley and vicinity of Lake Michigan; the best specimens by *Umbach*, from Miller's, Indiana, 30 July, 1897; Canton, Ill., 1875, *J. Wolfe*; Oquawka, Ill., *Patterson*, 1874. Distinct from *P. trifoliata* by its much smaller foliage and even larger fruits.

CYTOLOGICAL DIFFERENCES BETWEEN THE PALMELLA AND FILAMENTOUS FORMS OF STIGEOCLONEUM

By Naohidé Yatsu

It has long been known that *Stigeoclonium* takes two different forms according to environmental conditions. In dry atmosphere the alga is spherical and is known as the palmella form, while in a wet place it becomes filamentous. Four years ago, Dr. B. E. Livingston * succeeded in changing one form into the other simply by transferring the alga from one culture solution to another of different strength. At the suggestion of Dr. Mac-

* Livingston, B. E. On the stimulus which causes the change of form in polymorphic green algae. Bot. Gaz. 30: 289–361. 1900.

Dougal I undertook the cytological study of the two forms of *Stigeoclonium*. Owing to the minuteness of the cells, I could not satisfactorily carry out the study, yet I think I obtained a few points of interest. I am under great obligation to Dr. MacDougal for his kindly suggestions and criticisms, and also to Dr. Livingston, who not only has put some of his materials and solutions at my disposal, but also has given me much invaluable information.

I. Methods

Both the palmella and filamentous forms were examined in the living state. Especially was the transformation from one form to the other carefully studied. After several fixing fluids had been tried, I found that Boveri's picro-acetic acid proved better than any other. This, therefore, was used almost exclusively. All the preparations were stained *in toto* with borax-carmine; the sections were stained either with Auerbach's fluid (mixture of methyl green and fuchsin S) or with iron-alum-haematoxylin. To make total preparations of the filament, the following method was used. A clean cover-glass was touched on the surface of the water in a culture dish, where the filaments were floating. Then the cover-glass was dipped in the fixing fluid, which killed and fastened the algae at the same time. To obtain the total preparations of very young filaments, a drop of weaker solution was put on a cover-glass and a few palmella cells were kept in this drop for a week or so until the young filaments reached the two- or three-celled stage. Then all the solution was drawn off by means of filter paper, and the cover-glass was put in fixing fluid, which, as already stated, fixed and fastened the algae. To cut filaments into sections the following devices were used. A piece of *Ulva*, which had been preserved in alcohol, was washed with water and was fastened with albumen on a cover-glass. Then the *Ulva* was touched to the surface where filaments were floating and the cover-glass with the *Ulva* was put in the fixing fluid. After being clarified, the *Ulva* pieces with algae were peeled off from the cover-glass and cut into sections. The palmella cells were wrapped up in frog's epidermis to be cut.

II. Observations

A. *Filamentous Form.* — In the filamentous form, individual cells are cylindrical, two or three times as long as wide. The cell wall is very thin; the protoplasm spreads along the cell wall as a thin layer, the central part being occupied by a large vacuole. On one side there is a thickening of protoplasm, which sometimes reaches the other side, so that the central vacuole is cut into two. The terminal cell is somewhat different from others; it is usually longer than the rest of the cells and tapers toward the tip. The terminal cell has protoplasm of uniform thickness along all the walls. The central vacuole in it reaches the tip of the cell as a fine canal.

Fig. 1. Filament of *Stigeoclonium*, showing transformation from the palmella form (two lower cells) to the filamentous form (three upper cells), × 1,750. The dark bodies represent the nuclei; the lighter, the pyrenoids.

Chlorophyll granules of small size are found throughout the protoplasm.

The nucleus as a rule lies in the thickening of protoplasm just mentioned. It is difficult to see the nucleus in life. When stained it appears as a homogeneous black body. It consists mostly of chromatin. The presence of the nuclear membrane is in no way demonstrable.

Besides the nucleus there is a refringent pyrenoid body embedded in protoplasm. The position of this is not fixed; sometimes it is found near the nucleus, while in other cases it lies on the side opposite to the nucleus. Quite often it is surrounded by a clear space. In borax-carmine preparations on the other hand, it remains colorless or very light red, the nucleus being stained dark red. In cell-division it divides into two in a way not unlike the nucleus.

The first filament from the spore contains much protoplasm resembling that of the palmella form. The vacuole develops later. At the two-celled stage the terminal cell can be distinguished from the other cells. The branches can be sent off from any cell, the tranverse division taking place only at the tip.

B. *Palmella Form.* — The palmella cells are spherical, or quite often two, three or four cells make a sphere. The walls are thick compared with those of the filament. No vacuoles are found in the protoplasm. The chlorophyll granules are much larger than those found in the filament. In size and other characters of the nucleus one cannot find any difference between the two forms. Palmella cells have much larger pyrenoids than the filaments.

The palmella cells can be directly transformed into the filament by thinning of the walls, acquiring of the vacuoles, etc. In several cases, therefore, the intermediate forms are found.

The palmella form, being put into the weaker solution, usually produces zoöspores, two or four in a cell or sometimes as many as eight. The zoöspore has two flagella and a red eye-spot. The spores after swimming for a while acquire a firm wall or shell. Young filaments, even as late as the three-celled stage, often carry the empty shell at one end.

III. Conclusion

Recapitulating the differences : the filamentous form of *Stigeoclonium* has thinner wall, central vacuole, smaller chlorophyll granules, and smaller pyrenoids, whereas the opposite prevails in the palmella cells. These cytological characters change, as Livingston states, if one form is transferred from one solution into another of different strength. How the solution acts upon the cells I do not know. It is however certain that these complicated structural changes cannot be accounted for simply as physico-chemical action of the solution just as would be the case on an inorganic body. Livingston cites a case in which a dead cell changed its form, when transferred into a solution of different strength. The form change which constitutes a part of the above complicated modification may be due to the osmotic action, but we cannot at all explain from physical point of view how the thickening of the cell-wall, enlargement of the pyrenoid, etc., are brought about.

It is not an easy matter to find out whether or not the adaptation in this case is purposive. It seems to me however, that the increase of the thickness of cell wall and the enlargement of the

pyrenoid (reservoir of nutritive substance) may be indispensable to withstand desiccation or a drier atmosphere.

New York Botanical Garden.

FLOWERING OF YUCCA AUSTRALIS

By S. B. Parish

In 1878, the late Dr. C. C. Parry collected, in northern Mexico, seeds of a remarkable tree Yucca, which he had not been able to identify with any described species. On his next visit to California, in 1880, he gave some of these seeds to the writer. They germinated readily and the young plants were distributed to several friends in San Bernardino valley. They have grown well and have now attained a height of fifteen to twenty five feet, according to cultural conditions. Five years ago, the first of them flowered, producing, on a short, abruptly reflexed peduncle, a massive, compact panicle of pure white flowers, very much resembling in texture and shape the flowers of *Yucca mohavensis*, one of the common indigenous species of this region. It was readily recognized as that species of many synonyms, to which Trelease has given the name *Yucca australis* (Engelm.), perhaps the most distinct of the whole genus.

After flowering, this tree, which, like the others, was unbranched, divided into four short branches, and in the spring of the present year three of these produced each its panicle of flowers. It is shown by the illustration, which is reproduced from a photograph.

The tree is strikingly beautiful when in flower, far handsomer than it appears in the plate in Trelease's Yucceae, which is from a photograph taken in its native habitat in Mexico. Our trees have produced no fruit, doubtless by reason of the absence of the proper *Pronuba*. *Yucca australis* was introduced into the gardens of southern France about 1860, from seed collected by Roezl, the first tree flowering in its sixteenth year, and is there known under a variety of names. In the United States, the San Bernardino trees are probably the only flowering specimens, but it is well worth cultivation wherever the climate is suitable.

San Bernardino, California.

Yucca australis in flower at San Bernardino, California.

BOTRYCHIUM SILAIFOLIUM PRESL

By Lucien M. Underwood

This species was originally described from Nootka Sound, and all the American writers on ferns, commencing with D. C. Eaton, have confused a Californian species with it. I was led into the same error some years ago and wish now to make a correction. The collection of a large amount of material in the State of Washington by Mr. J. B. Flett and by Professor C. V. Piper has shown that the species of that region is nearer to Presl's type than any of the Californian material as yet collected and there seem to be no intermediate forms between the species of northern California and the one of the states farther north. On the other hand, Mr. Flett's specimens show gradations from my *B. occidentale* to the typical equivalents of *B. silaifolium* Presl. After I reached this conclusion two years ago, I learned that Mr. Piper had independently come to the same conclusion, viz., that, *B. silaifolium* Presl and *B. occidentale* Underw. were really one species. *B. occidentale* was described from tall rather slender plants of the species quite in contrast with the more compact form as originally described by Presl and represents an extreme development of the species. The relation of D. C. Eaton's "*sub-var. intermedium*" to this species was pointed out to me long ago by Mr. Gilbert and I am inclined to regard that form as representing the eastern extension of the western species or *vice versa*. I am not yet ready to locate this latter form as a variety or species, and hope that further collection and study will clear up some doubts in the matter.

The synonymy of the western species then is as follows:

Botrychium silaifolium Presl, Rel. Haenk. 1: 76. 1825. (Type from "Nootka-Sund.")

Botrychium occidentale Underw. Bull. Torrey Club 25: 538. 1898. (Type from New Westminster, British Columbia.)

Range: Washington to British Columbia.

This transfer of the Washington and British Columbia plants to *B. silaifolium* leaves the Californian plants hitherto referred to that species without a name. They may be described as follows:

Botrychium californicum sp. nov.

The largest of our species, with leaves 20–35 cm. across, the leaf of the preceding year usually long persistent. Roots fleshy, stout, fibrous: common stalk very short, 3–4 cm. long, subterranean; leaf-stalk 10–16 cm. long, stout, fleshy; leaf-blade 20–35 cm. wide, 15–25 cm. long, the three main divisions copiously tripinnate or often quadripinnatifid, the lower divisions more compound on the lower side of the base; segments 9–13 or more to each pinnule, obliquely oval, the larger more or less lobed, the margins crenate or eroded: sporophyl 15–25 cm. long, quadripinnate or more, on a stalk 30–45 cm. high.

This species was figured by D. C. Eaton, Ferns N. A. 1: *pl. 20a* (lowermost figure only) and called by him "*var. australe*" of his all-embracing *Botrychium ternatum*, the name *australe* coming from one of the smaller (Australian) species of the group, while this is one of the largest. It appears to be confined to northern California. Specimens have been studied as follows:

Sisson, Siskiyou County, 30 July, 1894, *M. A. Howe*; Sierra County, 1874, *Lemmon*; Quincy, Plumas County, *Mrs. R. M. Austin* (type), *Mrs. C. C. Bruce*; Emigrant Gap, *A. Kellogg*; all in the collections at the New York Botanical Garden, which include the collections of Columbia University and those of the writer, now incorporated in a single series.

Columbia University,
12 May, 1905.

SHORTER NOTES

Amelanchier arguta* Nutt.— This species has been mistaken for *Amelanchier oligocarpa* (Michx.) Roem. It differs in smaller, round-oblong fruit, calyx-lobes ovate, acute, about 2 mm. long, leaves ovate-oblong, cuneate at both ends, finely serrate. *A. oligocarpa* has larger, pear-shaped fruit, calyx-lobes lanceolate, acuminate, 3–5 mm. long, leaves oblong, more coarsely serrate. Specimens examined:

The technical type is a sheet in the herbarium of Columbia University inscribed "*Amelanchier arguta* Nutt. Waychusett, Mass."

* *A. arguta* Nutt. in herb. Torrey; Britton, Man. 1066. 1905 [Ed. 2].

Most of the description was taken from my *no. 1119*, Cedar Swamp, Fairhaven, Vt., altitude 100 meters, May 14, 1898, and June 27, 1899, and *nos. 1960* and *1964*, Blueberry Hill Bog, Rutland, Vt.

No. 52d, O. A. Farwell, Keweenaw County, Mich. (Columbia University herb.) and a specimen collected by J. A. Morton, at Wingham, Ont. (Eggleston herb.) are of the same species.

This species seems confined to the cold swamps of low altitude, while *A. oligocarpa* is arctic-alpine.

W. W. Eggleston.

New York Botanical Garden.

Nature's Engrafting.— About two years ago while wandering over a cypress flat, I found *Pieris nitida* growing from the trunk of *Taxodium imbricarium*. The branch was in a healthy, vigorous condition and grew more than a foot from the ground, as perfect a specimen of engrafting as could be done by the hand of man.

The tree was on the outer edge of the flat. The undergrowth showed no indication of having been inundated for a year at least. A few yards away there were numerous trees (*Taxodium*) standing in water a foot or more in depth, each surrounded by a luxuriant growth of *Pieris*. In the course of time I found the flat perfectly dry, as is the way with these cypress ponds of the pine-barren districts. I lost no time in further investigating the matter. Imagine my surprise, on brushing aside the dense foliage to find many of the trees encircled by a luxuriant growth of the *Pieris*, like a green collarette, quite high from the ground and having no connection with it. In Torreya of February, 1903, Mr. Roland M. Harper reported the peculiar habit of *Pieris phillyreaefolia* as seen by him in the Okefinokee Swamp climbing the *Taxodium*, explaining that it crept under the bark from the ground, and after ascending quite a height, branched out, having the appearance of a parasite. He also quoted Dr. Chapman's observations with regard to the same peculiar habit of this "make-believe" vine. There was no evidence of such a condition in this case. The plants had every appearance of having flourished and fruited for years. Mrs. Augustus P. Taylor.

Thomasville, Georgia.

A new Gentian from Bolivia. — **Gentiana dolichantha** Gilg sp. nov. Perennans. Radice ?: rhizomate certe decumbente reliquiis foliorum evanidorum obtecto, apice folia pauca laxe vel laxiuscule rosulata gerente: foliis lanceolatis vel linearilanceolatis, apice acutissimis, basi vix angustatis sed haud connectis, sub anthesi semper manifeste recurvatis, utrinque nitidis, subchartaceis, solemniter 3-nervatis: floribus 6-meris puniceis, in apice caulis erecti parce foliosi in cymam 3-floram dispositis, in axillis foliorum inferiorum semper solitariis, tenuissime longe pedicellatis, sub anthesi verisimiliter nutantibus: sepalis in parte $^3/_4$ alt. in calycem campanuliformem leviter 10-angulatum connatis, lobis liberis lanceolato-triangularibus, acutissimis: corollae tubo cylindraceo vel anguste cylindraceo, superne paullo ampliato, lobis tubi vix $^1/_3$ longit. aequantibus orbicularibus, breviter apiculatis.

Caule repente 8–12 cm. longo, parte erecta 17–25 cm. Foliis basalibus rosulatis quam cetera caulina haud majoribus, adultis 4–5 cm. longis, 4–5 mm. latis; internodiis 2.5–4, rarius usque 5 cm. longis. Pedicellis 1.5–4 cm. longis. Calycis tubo ca. 8 mm. longo, 5–6 mm. crasso, lobis 2.2–2.8 mm. longis, 2 mm. latis. Corollae tubo 2.2–2.3 cm. longo, 8–9 mm. crasso, lobis ca. 7 mm. diametro metientibus.

Bolivia: Pelichuco, 11,500 ped. s. m. (*Williams, n. 2489.* Flores maio 1902).

Species nova affinis *G. puniceae* Wedd., sed floribus majoribus longius tubulatis calyceque alte connato campanulato diversa.

Ernst Gilg.

Berlin.

A Trio of Grasses new to the West Indies. — Among the plants collected by Mr. W. E. Broadway, in Granada in 1904, is a specimen of *Polytrias praemorsa* Hack., secured at St. George's, growing in pasture land. This grass is native in Java, and its appearance as an introduction into the West Indies is rather interesting.

A word in reference to the nomenclature of this species may be appropriate here. In Hackel's treatment of the Andropogoneae (D. C. Monog. Phan. 6: 189), in the synonymy under his *P. praemorsa*, in reference to the *Andropogon diversiflorus* Steud. (Syn. Gram. 370), the following statement is made: "nomen specificum a me rejectum quia in speciminibus bene evolutis

spiculae omnes ♀, in macris tantum et raro pedicellatae hebetatae inveniuntur." Of course this is not a valid reason for discarding a name properly published, and cannot be countenanced. Immediately following his publication of *Andropogon diversiflorus*, and on the same page, Steudel describes another species, *Andropogon firmandus*, which Hackel also cites in the synonymy. For some reason unexplained, this specific name is not taken up, although tenable, and the name *praemorsa* adopted, first published by Steudel in the same work (*l. c.*, 409) under the genus *Pollinia*. Steudel cites no specimen as the type of this species but simply indicates that the plant came from Java. The description he gives certainly does not apply to the monotypic genus *Polytrias*, as described by Hackel, for a generic requirement of that genus is that the spikes shall be borne singly, and yet Steudel in the description referred to above distinctly states that in *Pollinia praemorsa* the spikes are in twos or threes. I am aware that Hackel follows his reference to this name with an !, but certainly if this is so the generic character of a single spike breaks down. Of course this question as to the name *praemorsa* really is of little importance, for the name to be used is *diversiflorus*, and the combination should stand as follows:

Polytrias diversiflora (Steud.)

Andropogon diversiflorus Steud., *l. c.*

A second member of the Andropogoneae, also, has made its advent into the West Indies. This is *Ischaemum rugosum* Salisb., a native of Asia. A specimen of this was obtained by Mr. A. H. Curtiss, at Madruga, Cuba, on November 24, 1904, *no. 533*. One other species of this genus, *I. latifolium*, is quite extensively found in the West Indies and on the mainland of South America.

The third introduction is from the New World, and is *Opizia stolonifera* Presl, a member of the Chlorideae, with monoecious spikelets, a native of Mexico. It was first secured by Dr. J. A. Shafer on dry soil, at Regla, Province of Habana, Cuba, April, 1903, *no. 482*; and it has now been again secured at Habana, on December 19, 1904, by Mr. A. H. Curtiss, *no. 571*.

New York Botanical Garden. George V. Nash.

REVIEWS

North American Flora*

About ten years ago it was proposed to publish under the title "Systematic Botany of North America" a descriptive account of all plants growing without cultivation in North America, north of Mexico. As originally planned, the work was to consist of seventeen volumes, eight of which were to be devoted to the Angiosperms. The different families of plants were assigned to specialists for elaboration, and the following botanists constituted the board of editors: Professors Atkinson, Britton, Coulter, Greene, Halsted and Underwood, and Messrs. Coville and Hollick. For some reason no part of this work ever reached publication, with the exception of a short pamphlet on the Hepaticae by Professor Underwood, in which the species of the single genus *Riccia* were described.

Recently, however, it has become possible for the New York Botanical Garden to assume responsibility for this important undertaking and to carry it on in a somewhat more extended sense than was originally intended. The title has been changed to "North American Flora," and the region treated will include not only the whole of the North American continent, north of Colombia, but also the majority of the West Indian islands. The new publication will be edited by Professors Underwood and Britton and will consist of thirty volumes. Thirteen of these will be devoted to the Thallophytes, two to the Bryophytes, one to the Pteridophytes and Gymnosperms, and the remainder to the Angiosperms. The parts will be issued as rapidly as possible, and different volumes will be in course of publication at the same time.

The part that has just appeared may serve to indicate the plan of the whole work and treatment which the various groups are to receive, although it is possible that this treatment will have to be more or less modified in the case of some of the lower cryp-

*North American Flora, 22 : 1–80. Rosales, by J. K. Small; Podostemonaceae, by G. V. Nash; Crassulaceae, by N. L. Britton and J. N. Rose; Penthoraceae and Parnassiaceae, by P. A. Rydberg. The New York Botanical Garden, 22 My 1905.

togams. After a general account of the Rosales, with an analytical key to the twenty four families included in this order, the genera and species in four of these families are described. The Podostemonaceae are represented by 5 genera with 10 species, the Crassulaceae by 25 genera with 284 species, 30 of which are new, the Penthoraceae by a single genus with one species, and the Parnassiaceae by a single genus with 13 species, 4 of which are new. Under the Crassulaceae, 4 new genera are proposed, and many other recently proposed genera are recognized. An important feature of the work is found in the analytical keys, each genus (unless represented by a single species) having a key to the species and each family a key to the genera.

As a rule the descriptions, both generic and specific, are concise. Under each genus the description is supplemented by an enumeration of the synonyms and the name of the type species. Under each species, in addition to a full synonymy, the type locality and the geographical distribution are described, and references are given to all published illustrations. In the case of a new species, the type locality is described more fully, the name of the collector and the date of collection being added. In most cases, however, no reference is made to the time of flowering or fruiting. It should also be noted that very few of the descriptions are accompanied by critical remarks, these being rendered unnecessary by the numerous keys.

Perhaps the feature of the work which will be most criticized is its strong tendency toward the segregation of large and comprehensive genera into smaller and more rigidly defined genera. A similar tendency is also to be observed in the limitation of species. Both of these tendencies are especially well seen in the treatment of the Crassulaceae. It should be remembered, however, that the descriptions in this difficult family are nearly all drawn from living specimens, and that the segregations are therefore based upon a very intimate knowledge of the plants.

Alexander W. Evans.

Yale University.

PROCEEDINGS OF THE CLUB

Wednesday, April 26, 1905

This meeting was held at the museum of the New York Botanical Garden, with seventeen persons present and President Rusby in the chair.

A letter from the Brooklyn Institute of Arts and Sciences proposing coöperation in the field excursions of the Club was read and referred to the chairman of the field committee with power to act.

The announced paper by Dr. P. A. Rydberg on "The Composition of the Rocky Mountain Flora" was omitted by reason of the absence of the author.

"Notes on the Wire-Grass Country of Georgia" was the title of the paper presented by Mr. R. M. Harper.

The wire-grass country takes its name from the wire-grass, *Aristida stricta*, which is common all over it. In a broad sense, the wire-grass country coincides with the pine-barrens, which constitute about two thirds of the coastal plain of Georgia, but for the present purposes the term is restricted to the Altamaha Grit region, an area of about 11,000 square miles.

The climate of the region, as compared with New York City, is about 18° warmer in winter and 9° warmer in summer. The rainfall averages about 50 inches a year, and most of it falls in the growing season. The geographical conditions are remarkably uniform throughout, and on account of this uniformity the flora is not very rich, only about one half as many species being known there as in the state of New Jersey, though the area is larger.

The region is naturally forested throughout, but the forests are mainly of long-leaf pine, which gives little shade. Consequently, the most striking feature of the vegetation as a whole is the adaptation to sunlight, usually manifested by reduction of leaf-surface.

The plants of the wire-grass country can be classified according to habitat into 15 or 20 groups. The principal habitats are

rock outcrops (constituting perhaps about one one-hundredth of one per cent. of the area), pine-barrens (over half the area), swamps, ponds, sandhills, hammocks and bluffs, some of these with several subdivisions.

Civilization has influenced the flora principally through agriculture, lumbering, turpentining and fires. Only a small proportion of the land may be said to be under cultivation. Lumbering has little effect on the herbaceous flora, for the removal of the pine trees does not appreciably diminish the amount of shade. The turpentine operators have been practically all over that part of the country, and have done great damage to the forests. Fires sweep over most of the region every spring, being set purposely by stock-raisers to burn off the dead grass, but the fires do little damage where lumbering and turpentining operations have not been carried on.

The known flora of the Altamaha Grit region consists of about 725 native species of flowering plants, 75 weeds, 20 pteridophytes and 60 bryophytes and thallophytes. The lower cryptogams have been little studied. The largest families are Compositae, 100 species, Cyperaceae, 83, Gramineae, 68, Leguminosae, 50, Scrophulariaceae, 30.

Some of the commonest species of the region are *Pinus palustris*, *P. Elliottii*, *P. serotina*, *Taxodium imbricarium*, *Aristida stricta*, *Serenoa serrulata*, *Eriocaulon decangulare*, *Quercus Catesbaei*, *Eriogonum tomentosum*, *Magnolia virginiana*, *Sarracenia flava*, *S. minor*, *Kuhnistera pinnata*, *Cliftonia monophylla*, *Nyssa biflora*, *N. Ogeche*, *Oxypolis filiformis* and *Pinckneya pubens*.

The following species are common in the wire-grass country (each being known from at least three counties), but are seemingly confined to Georgia: *Sporobolus* (a species with terete leaves), *Rhynchospora solitaria* Harper, *Eriocaulon lineare* Small, *Polygonella Croomii* Chapm., *Siphonychia pauciflora* Small, *Viola denticulosa* Pollard (with leaves a foot and a half long), *Dicerandra odoratissima* Harper, *Pentstemon dissectus* Ell., *Baldwinia atropurpurea* Harper, *Marshallia ramosa* Beadle & Boynton, and *Mesadenia* sp. (near *lanceolata*).

One of the most interesting features of the pine-barren flora,

not generally known to botanists, is that the whole region was submerged beneath the sea in Pleistocene times, consequently the species now confined to the pine-barrens (from New Jersey to Texas), perhaps several hundred in number, have probably originated since that time.

Mr. Harper's remarks were illustrated by many photographs and specimens. The paper was discussed by Drs. Britton and Rusby.

Mrs. Britton then spoke of certain interesting southern mosses, especially of *Erpodium*, a curious genus having the habit of a *Frullania* or *Lejeunea*. A species of this collected many years ago by Sullivant at Augusta, Georgia, was published by Austin as a hepatic under the name *Lejeunea biseriata*. Mrs. Britton discussed and exhibited also numerous mosses from the extreme southern part of Florida. A few of these appear to be undescribed but most of them are of species that are widely distributed in the West Indian region.

Dr. Rusby showed specimens of spurious ipecac roots which have found their way into the markets. The true ipecac (from *Cephaëlis Ipecacuanha* of the family Rubiaceae) is now hard to obtain and high-priced. Some of the spurious root comes from other species of the same genus, but the most common adulterant is from the genus *Ionidium* (*Calceolaria*) of the family Violaceae. Dr. Rusby exhibited also specimens of *Porteranthus stipulatus*, which is sometimes called the North American ipecac.

Dr. Britton showed living plants of two species of Crassulaceae which had come into flower in the greenhouses of the New York Botanical Garden. One was *Sedum Nevii*, hitherto described from dried material, a species collected originally in southwestern Virginia, but since found to extend to Indiana. The other was a *Pachyphytum* from Mexico. Dr. Britton stated that in North America north of the Isthmus, 284 species of Crassulaceae may be recognized, distributed in 25 genera. Representatives of all these genera have now been studied in the living state.

Before adjourning, it was voted to hold the next meeting at the Botanical Garden in the afternoon instead of at the Museum of Natural History in the evening. MARSHALL A. HOWE,

Secretary pro tem.

NEWS ITEMS

Miss Marion E. Latham, A.M. (Columbia, 1905), has been appointed assistant in botany in Barnard College, Columbia University.

Professor George F. Atkinson, of Cornell University, is spending the summer vacation in Europe, engaged chiefly in his studies of the fleshy fungi.

Dr. P. A. Rydberg, of the New York Botanical Garden staff, left New York on May 29, to spend most of the summer in making botanical collections in Utah.

Miss Alice A. Knox, who for the past two years has been assistant in botany in Barnard College, is now assistant in the laboratories of the New York Botanical Garden.

Professor and Mrs. Francis E. Lloyd left New York on June 3, for Tuscon, Arizona, where Professor Lloyd will continue his researches at the Desert Botanical Laboratory of the Carnegie Institution.

Mr. E. W. D. Holway, of the University of Minnesota, has begun the publication of a quarto work entitled "North American Uredineae." Part I of volume I, consisting of 32 pages and 10 plates, was issued April 15.

It is learned from *Science* that Dr. B. M. Duggar, professor of botany in the University of Missouri, sailed for Europe on May 20 and that he will devote the coming year to work in various botanical laboratories on the Continent.

Dr. and Mrs. N. L. Britton sailed for Europe on May 27 to attend the International Botanical Congress in Vienna. They will visit also the botanical establishments in Paris, Geneva, Berlin and Kew, returning to New York in the latter part of July.

Mr. F. V. Coville and Mr. W. F. Wight, of the United States Department of Agriculture, were among the American delegates to the International Botanical Congress which met in Vienna, June 11 to 18. Their names were omitted in the partial list of American delegates published in TORREYA for April.

The annual field meeting of the Vermont Botanical Club and the Vermont Bird Club will be held July 4 and 5, taking this year the form of a cruise to various points of interest on the islands and northern shores of Lake Champlain. A steamer has been chartered for the occasion.

Bulletin No. 68 of the Bureau of Plant Industry is a monograph of the "North American Species of *Agrostis*" by A. S. Hitchcock. Most of the type specimens involved in the study have been seen by the author either in this country or in Europe. The text is accompanied by 37 plates.

The second annual field "symposium" under the joint auspicies of the Philadelphia Botanical Club, the Washington Botanical Club and the Torrey Botanical Club, which will be held at Ohio Pyle in southwestern Pennsylvania July 3 to 8, promises features of unusual interest. The region is said to have an exceedingly rich flora, including many southern elements which are scarcely found elsewhere in the state. Dr. J. A. Shafer and Dr. W. A. Murrill will act as guides on behalf of the Torrey Club.

Fascicle I of "Orchidaceae: Illustrations and Studies of the Family Orchidaceae issuing from the Ames Botanical Laboratory, North Easton, Massachusetts," by Oakes Ames, was published in April. The 16 plates in this fascicle illustrate 19 species, including five new ones from the Philippines. Papers under the titles, "A descriptive List of the Orchidaceous Plants collected in the Philippine Islands by the Botanists of the United States Government," "An *Oncidium* new to the United States," and "Contributions toward a Monograph of the American Species of *Spiranthes*" complete the fascicle.

From the Olivia and Caroline Phelps Stokes Fund for the Protection of Native Plants, the New York Botanical Garden offers the following prizes, payable December 15, 1905:

1. A prize of $25.00 for the best essay on local needs in the vicinity of New York City, not to exceed one thousand words.

2. A prize of $15.00 for the best essay indicating local needs in the parks of New York, not to exceed one thousand words.

3. A prize of $10.00 for the best essay not to exceed five hundred words, indicating needs of any locality. Essays may be submitted not later than November 1, to the Director-in-chief of the New York Botanical Garden, Bronx Park, New York City.

Vol. 5 No. 7

TORREYA

July, 1905

AN EXAMPLE OF COMPLEX LIFE-RELATIONSHIP

By Albert Schneider

The plant as well as the animal kingdom presents numerous very interesting and complex life-relationships which the biologist recognizes as symbioses, the naturalist as struggle for existence, and the socialist, if he is scientifically inclined, as competition.

A somewhat remarkable instance of symbiosis has recently come under my observation. During the vacation months (May, June, and early July) of 1904, my little daughter and myself were in the habit of taking short morning rambles in the vicinity of our Berkeley home. On Hillegass Avenue near Dwight Way, we noted a row of hawthorns (*Crataegus Oxyacantha*), about twelve feet high. Most of the plants were well infested with plant-lice (*Aphis Crataegi*) at this time of the year (June). These pests were found most abundant on the under surface of the leaves and on the young terminal branches and buds, and wherever the bark was unusually thin, injured or abraided; that is, in places where the cell sap was most readily obtainable. Upon closer examination, it was found that some of the plant-lice were of a black color, due to a fungus attacking them. The remarkable feature was that the parasitized plant-lice seemed, at first, to be quite uniformly distributed among the green healthy individuals. Gradually the fungus disease spread, until perhaps one-third to one-half of all the plant-lice on one particular hawthorn were blackened, but not dead. Many were no doubt killed and fell to the ground. A thin scattering stream of ants (the honey ant, *Myrmecocystis melliger*) was continuously moving up and down the trunk and branches of the hawthorns. The ants visited the *Aphis* and took from them the sweet secretion (honeydew) found in the posterior glands. Occasionally an ant

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was seen carrying a plant-louse, usually a young one, down the trunk. What the fate of these plant-lice was we were unable to determine. Perhaps they were intended to serve the purpose of starting new colonies on other plants but more likely they were taken to the home of the ants to serve as food, for ants feed on plant-lice when the appetite is upon them, just as man keeps cows both for milk and meat. I am, however, inclined to doubt the statements of many naturalists who speak of the carefully conducted hygienic aphis-dairying industries of ants. In countries with suitable climatic conditions, as, for example, California, aphides are very plentiful and widely distributed upon a great variety of plants, and ants cannot well avoid running across them on hawthorns, roses, chenopodiums, thistles, plum-trees and a host of other plants.

The starting of new colonies of *Aphis* seems wholly unnecessary, yet who is there to know all of the factors concerned in the ant commercial competition? Be that as it may, the ant is not the only organism that finds the *Aphis* an available economic victim. We noted several species of beetle of the ladybird variety, quite numerous and quite constantly present in the grass (*Poa*) and on other plants near the infested hawthorns. The brown-winged ladybird (*Hippodamia convergens*) was found to feed very voraciously upon the plant-lice. It was roughly conjectured that one ladybird would destroy (feed upon) its own weight of plant-lice in the course of one night. Some of these handsome little beetles were found basking in the morning sun, evidently digesting a heavy meal. Others were busily engaged with their breakfast. This ladybird promises to be of economic value in the extermination of plant-lice. A report on its possible uses is about to be published by the Dept. of Agriculture of the University of California. Another beetle (dark green elytra with black spots) (*Diabrotica Soror*) was also quite constantly present and seemed to feed upon *Aphis*, although it also feeds upon the black fungus on the hawthorn and the diseased plant-lice above referred to. A lightning bug (*Podabrus pruniosus*) is also an occasional visitor and feeds upon plant-lice. The ants and beetles pay no attention to each other, evidently because they realize the fact that they are incapable of harming each other.

A species of yellow-jacket (*Vespa*) visits the hawthorn for the purpose of securing plant-lice for its larvae. Various species of flies (Diptera) were found to visit the plant-lice to take from them the sweet honeydew and these winged aerial marauders take care to keep out of reach of the ants, which they are readily enabled to do. Another and larger species of ant was occasionally found on the hawthorn. While it was quite evident that it was also in quest of the honeydew of the *Aphis*, it was equally evident that it was mortally afraid of the smaller but decidedly more pugnacious honey-ant, making every effort to keep out of the way.

Another ladybird (*Coccinella californica*) also feeds upon the *Aphis*, but is much less voracious in its appetite than the *Hippodamia*. The ladybirds were however not sufficiently numerous to destroy all of the aphides which multiply so rapidly that there seemed to be no diminution in their number, in spite of these numerous life-destroying enemies. Later in the season (the latter part of July and the early part of August), the *Aphis* began to disappear gradually so that practically none remained by the middle of September. This sporadic and often sudden disappearance of *Aphis* has been noted frequently but is not as yet satisfactorily explained. The natural enemies as ladybirds and the fungus referred to are evidently not the only factors concerned in these disappearances. Various birds, as sparrows and others, are often seen to feed upon the *Aphis*, scooping them up in large numbers by a peculiar side twist of the bill.

A black fungus lives upon the leaves, leaf-stalks and younger branches of the hawthorns, causing them to become unsightly in appearance, although no serious damage is done. It is very evident that the plant-lice are the cause of this fungous investment as the growth starts in the *Aphis* and then spreads over the plant. Besides this fungus, there are other vegetable symbionts, as various algae, bacteria and other fungi, which, however, have no apparent influence upon the life history of the host plant (hawthorn). The various more serious diseases of the hawthorn, due to fungi and insects, are not touched upon in this paper as this would further complicate the biological relationship and

furthermore constitutes a condition essentially different from that discussed in this paper.

This interesting symbiosis or biological relationship may be summarized as follows:

1. The bone of contention seems to be the plant-lice (*Aphis Crataegi*) which are antagonistically associated with the hawthorn (*Crataegus Oxyacantha*), feeding upon the cell sap of leaves, growing tips and injured or thin portions of the young bark.

2. A hyphal fungus infests the plant-lice, destroying many of them and finally spreading over the exterior of leaf and stem of the hawthorn. The fungus is therefore decidedly antagonistic to the *Aphis* and rather indifferently antagonistic to the hawthorn.

3. Two species of ant, antagonistic to each other and mutualistic to the hawthorn, feed upon the honeydew of the *Aphis* and upon the *Aphis* itself and are therefore antagonistic to these organisms.

4. Several species of beetles, indifferently associated with each other but mutualistically associated with the hawthorn, feed upon the *Aphis*, forming therefore a decided antagonism to the *Aphis*.

5. One species of ladybird (*Diabrotica Soror*) feeds upon the fungus and diseased *Aphis*, thus forming a mutualistic (though perhaps not pronounced) association with both *Aphis* and hawthorn.

6. The yellow-jacket feeds upon the *Aphis* thus forming an antagonistic association with these as well as with the ants, but mutualistic with hawthorn.

7. A similar association exists between birds, *Aphis*, ants and hawthorn.

8. Flies are antagonistic to the interest of ants as well as *Aphis* and mutualistic to the hawthorn itself.

From this maze of complicated biological relationship it would appear that the plant-lice must be at a decided disadvantage in the struggle for existence, since it is very evident that they have numerous enemies and apparently no true friends. Furthermore, as compared with these enemies they are physically helpless, being mostly wingless, slow of motion and without means of offense or defense. These deficiencies are however

more than balanced by their rapid propagation. In spite of the numerous aids and friends of the hawthorn, the combined work of the *Aphis* and the black fungus succeed in making the plants quite unsightly during the summer months, though none are actually killed.

In conclusion it may be stated that plant-lice are quite easily controlled by spraying and fumigation, directions for which may be obtained from almost any state experiment station or from the Dept. of Agriculture, Washington, D. C. The behavior of the black fungus would suggest a cure by distributing the diseased *Aphis* among the infested plants; or if large numbers of diseased *Aphis* are available, they might be crushed and mixed with water to be applied as a spray, thus spreading the disease more quickly and uniformly. This method would seem especially feasible during a rainy period as moisture favors the spreading of the disease, whereas dry weather promptly checks it. This is certainly worthy a trial and further study. It will also be interesting to find what the California Agricultural College may recommend in regard to the possibilities with the ladybird beetles.

California College of Pharmacy, San Francisco.

QUELQUES MOTS SUR L'ARTICLE DE MR. UNDERWOOD: "A MUCH-NAMED FERN"

By H. Christ

Dans le no. 5, vol. 5 (Mai 1905) de Torreya, Mr. Lucien Underwood relève le fait, regrettable sans doute, que j'ai rebaptisé une petite fougère, nommée d'abord *Acrostichum Moorei* E. G. Britton, sans connaître son nom primitif, et que j'ai changé plus tard mon nom à plusieurs reprises. Avec la verve critique qui lui est propre, il se récrie: "And all this is German systematic (?) botany of the twentieth century instead of the nineteenth, where it would not so much surprise us."

Je me hâte de revendiquer ce compliment exquis pour moi exclusivement, pour moi qui ne suis point Germain, mais humble Suisse, absolument neutre dans la lutte acharnée des grandes nations qui s'infiltre partout, même dans la Science aimable!

Car, si Mr. Hieronymus — de race Germanique celui-là — a commis aussi une petite erreur en fait de la nomenclature de cet *Acrostichum*, ce n'est qu'une peccadille, à laquelle il a été entrainé par moi.

Admettons donc que j'ai " overlooked " la publication de Britton, et confessons notre péché. Est-ce un péché véniel ou non? Je n'ose le discuter, mais y a-t-il un seul botaniste systématique, y compris les Américains les plus avancés, dont la conscience est parfaitement limpide a cet égard? *

Mais Mr. Underwood m'accuse d'avoir rebaptisé la plante plusieurs fois encore, et telle accusation lancée sans explication aucune, doit diminuer singulièrement l'appréciation de mes travaux aux yeux de mes confrères Américains. Heureusement, je suis un peu moins noir que le grand critique de Bronx Park se plait à me dépeindre, car je n'ai pas rebaptisé à tort et à travers, par inadvertance ou incurie, mais par des motifs sérieux, comme Mr. Underwood a dû savoir, et je lui reproche de ne pas avoir éclairé le lecteur sur ces motifs-là, car alors le lecteur aurait dû juger autrement de mon travail.

Mr. Underwood doit savoir qu'il y a des cas où il est non seulement permis, mais où il est de rigueur de changer des noms, droit dont il a usé lui-même sur une énorme échelle, en changeant presque tous les genres généralement admis jusqu'-ici et admis par lui-même auparavant.

Eh bien, montrons au lecteur très-brièvement comme je suis arrivé à changer ce nom :

J'ai placé la plante que je croyais nouvelle et non decrite alors, dans mon livre Farnkr. der Erde 46 dans le genre *Rhipidopteris*, en l'appelant *R. Rusbyi*.

Dans ma monographie du genre Elaphoglossum 99 où j'ai réuni, je crois par de bonnes raisons, le genre *Rhipidopteris* comme une section au grand genre *Elaphoglossum*, j'ai nommé la plante *E. Baugii*. On peut critiquer le changement du nom spécifique

* Du reste, lorsque Mr. Underwood m'a rendu attentif, par lettre privée à mon erreur, je me suis hâté de la rectifier (voyez Bullet. Herb. Boiss. II. 3 : 148. 1903) et j'avoue que les usages entre confrères, au moins ceux qui sont en vigueur en Europe au 20ème siècle, auraient autorisé Mr. Underwood de se contenter de ce *peccavi* public, sans le relever encore une fois dans la TORREYA.

au point de vue des règles de Genève, mais je suis un vieux routinier qui ai commencé ma botanique déjà dans la première moitié du 19e siècle, et je me suis laissé entraîner par un sentiment de justice envers celui qui a découvert la plante: Mr. Bang, dont j'ai voulu rappeler le nom à l'occasion du changement du genre. C'est une infraction au code, j'en conviens, mais on sait qu'il y a de ces têtes carrées, aimant la liberté, qui se permettront toujours de ces écarts-ci. Plaignons-les, mais consolons-nous, car ce sont de vieux troupiers qui heureusement ne vivront plus en peu d'années, et laisseront le champ libre aux nomenclaturistes corrects du plein 20e siècle.

Plus tard, j'ai eu le grand plaisir d'obtenir le premier échantillon sorifère de notre plantule, dont je n'avais vu auparavant que des pieds stériles. C'était pour moi une révélation, sous l'impression de laquelle j'ai écrit mon article qui porte l'inscription un peu emphatique: "*Elaphoglossum* (*Microstaphyla*) *Bangii*, une fougère ancestrale." (Bullet. Herb. Boiss. II. 1: 588.) J'ai démontré pour la première fois et victorieusement, car Mr. Underwood l'admet après moi, que la plante n'est point un *Polybotrya* comme on a cru auparavant, mais a les plus grands rapports avec le *Microstaphyla* de Ste. Hélène et sert à mettre en lumière cette espèce isolée en la liant intimement aux Elaphoglosses.

Mr. Underwood qui aime à voir des genres là où d'autres ne voient que des sections, s'est donné la satisfaction de rebaptiser notre plante pour la *cinquième* fois, tout en suivant ma manière de voir, en l'appelant *Microstaphyla Moorei* (E. G. Britton) Underw., procédé auquel nous n'avons rien à objecter.

Il résulte de ces "details of the story" que nous avons remanié les noms, non par plaisir ou par négligence, mais successivement à la recherche des affinités naturelles de la plante, affinités que nous avons pu fixer enfin.

A mon humble avis, Mr. Underwood aurait agi plus correctement en disant deux mots de tout cela aux lecteurs de la Torreya, au lieu de les placer sous l'impression que les Germains changent les noms par pure "carelessness." La science a son développement qui est souvent laborieux et nécessite des amendements, des changements. Il y a peu d'esprits absolument

primesautiers qui trouvent infailliblement le juste au premier essai ; même en Amérique ils sont rares. La science fait donc bien de se contenter aussi d'ouvriers modestes qui arrivent au résultat avec plus de peine, en tâtonnant.

Bâle, Suisse,
16 Juin, 1905.

DERIVATION OF THE NAME CHAMAECRISTA

By Edward L. Greene

Called on not long since in private for an explanation of the meaning of the generic name *Chamaecrista*, I think it may be well to offer here in detail the answer which I then gave in brief, and orally to the enquirer; for the name has never been explained in any book, the genus itself dating, practically, from my own defense of its validity made publicly only a few years ago.*

The derivation of *Chamaecrista* is so inseparably connected with the history and nomenclature of an older and nearly related genus that one must go back to the botany of more than two centuries ago for the real origin of the name in question.

One of the most graceful and elegant, if not the most showy, among many ornamental trees and shrubs of the family of the Caesalpiniaceae is that to which Linnaeus gave the name *Poinciana pulcherrima*, a shrub now common in parks and gardens in all tropic and subtropic lands and often to be seen in conservatories far northward. In its large clusters of few and large flowers, the bright red stamens are more conspicuously beautiful than the yellow corollas. There are ten of these to each flower, the greatly elongated glossy filaments each surmounted by its anther, and all standing out away beyond the corolla ; and this cluster of stamens evidently suggested to the first botanical observer and investigator of the shrub, that crest of slender graceful round-topped feathers that adorns the head of a peacock ; and, as this superbly flowering shrub was then new and in need of a name, the botanist, whom I shall presently mention, called it *Crista Pavonis*.

* Pittonia, 3 : 238.

The author was Jacob Breyne, whose fine folio of descriptions, with excellent copper-plate engravings, of one hundred new or rare exotics, was published at Dantzic, in the year 1678, and now numbers itself among the rich classics of seventeenth-century botany. Up to that time, as well as even somewhat later, botanical nomenclators were indifferent as to whether a generic name were made up of one word or of two, or even three; and Breyne, in the present instance, offered to the public a choice between two names for this new type, each of them a generic name of two terms, each alluding to that semblance of a peacock crown presented by the stamens. It might be denominated "*Frutex Pavoninus*, sive *Crista Pavonis*"; and contemporary botanists adopted the second of the two; and this latinization of peacock's crest remained the accepted name of this beautiful genus until Tournefort — something of a reformer in nomenclature — renamed it *Poinciana*.

Thus far we seem to have arrived at no more than the origin of the last half of the name *Chamaecrista;* but the history of the first half may be told more briefly.

In the selfsame volume in which *Crista Pavonis* was published as a genus, Breyne proposes a second new genus belonging to this same family; the type of this a low herb, yet in some of its aspects so much like *Crista Pavonis* that he names this one *Chamaecrista Pavonis*, the low, or dwarf peacock's crest. This plant so named by Breyne is the historic type of the modern genus *Chamaecrista*. Linnaeus, in 1753, decided that it might be viewed as a species of the genus *Cassia*, and, dropping the second term, *Pavonis*, of Breyne's double-worded generic name, the great reformer assigned the plant the binary name *Cassia Chamaecrista*.

In restoring to its well-merited rank this genus originally proposed by Breyne, it was fitting that it should bear the name *Chamaecrista* rather than Breyne's original and too sesquipedalian *Chamaecristapavonis*. We realize our general indebtedness to the Swedish reformer of nomenclature, who knew so well how to abbreviate names that seemed too long; and we seem likely to need him again, or some other in his place, by and by: for

Chamaecristapavonis, long as it looks, is but by one syllable longer than a somewhat recent generic name *Pseudocymopterus*, and is of just the same length as *Neowashingtonia*, still more recently proposed.

Washington, D. C.

TWO MISINTERPRETED SPECIES OF XYRIS

By Roland M. Harper

The name *Xyris flexuosa* Muhl. has been almost always applied to a certain widely distributed species which is about the only representative of its genus over most of the glaciated region of the northeastern United States.* This name is usually considered as dating from the first edition of Muhlenberg's Catalogue, published in 1813, but in that work there is nothing by which the species can be definitely identified, and indeed no specific descriptions were attempted in the whole catalogue. (The words in the fourth column, on which so much stress was laid by Mr. Bicknell and Dr. Robinson in discussing the identity of certain species of *Agrimonia* a few years ago, are expressly stated by Muhlenberg in his preface to be merely the English names of the species, and they cannot therefore be regarded as descriptions.) For the original description of *Xyris flexuosa* we must turn to the first part of the first volume of Elliott's Botany of South Carolina and Georgia, published in 1816, in which four species of *Xyris* were recognized. Two of these were new, based on the collections of Dr. Baldwin in Georgia, and another was identified by Elliott with *X. brevifolia* Mx., but was later found by Dr. Chapman to be quite different, and named by him *Xyris Elliottii*. The remaining one is *X. flexuosa* Muhl., and the description, habitat, and time of flowering assigned to it point clearly enough to a plant with corkscrew-like stem and twisted leaves which we now know to range from New Jersey to Florida and Texas, mostly in the pine-barrens, and which was known to nearly all 19th century authors as *X. torta*. Elliott gives as a synonym *X. caroliniana* Walt., but this species can hardly be identified, since it was the

*See Rhodora 7 : 73. 1905.

only *Xyris* mentioned by Walter, and the description gives none of the characters by which the several species are now distinguished from each other. There is said to be no specimen bearing this name in Walter's herbarium, but even if there was it would not validate a totally inadequate description, so the name *X. caroliniana* Walt. should be dropped entirely, unless we accept the interpretations of Lamarck, Vahl and other authors who published between the times of Walter and Elliott. In 1860 Elliott's *Xyris flexuosa* was identified by Dr. Chapman with his own *X. platylepis*, and if this identification was correct *X. platylepis* would become a synonym; but it was evidently not correct, and Dr. Chapman himself questioned it in the last edition of his Flora, in 1897.

As for *Xyris torta*, described by J. E. Smith in the 39th volume of Rees's Cyclopedia in 1819, Dr. A. B. Rendle showed a few years ago * that that was really the common northern plant known for years as *X. flexuosa;* and on this representation *X. torta* was relegated to synonymy in Britton's Manual and Small's Flora. But according to the evidence brought out above, both names seem to be valid, though they will have to be interchanged, as follows:

XYRIS FLEXUOSA Muhl.; Ell. Bot. S. C. & Ga. 1: 51. 1816.

? X. caroliniana Walt. Fl. Car. 69. 1788. (Unrecognizable.)

"*X. torta* J. E. Smith" Kunth, Enum. 4: 14. 1843; and many subsequent authors.

X. arenicola Small, Fl. S. E. U. S. 234. 1903.

Range: New Jersey to Florida and Texas, in the coastal plain, especially in the pine-barrens.

XYRIS TORTA J. E. Smith (no. 11), Rees's Cycl. 1819.

X. bulbosa Kunth, Enum. 4: 11. 1843.

"*X. flexuosa* Muhl." Chapm., Fl. S. U. S. 500. 1860; and all or nearly all subsequent authors.

Range: Eastern United States and adjacent Canada, chiefly in the glaciated region.

Other synonyms can be found in the paper by Dr. Rendle mentioned above. Dr. Small, who has given this genus consid-

* Jour. Bot. 37: 497–499. 1899.

erable study, believes the Cuban *V. conocephala* Sauv. (proposed as a substitute by Dr. Rendle) distinct from the North American pine-barren species.

College Point, New York.

PROCEEDINGS OF THE CLUB.

Tuesday, May 9, 1905.

This meeting was held in the afternoon at the N. Y. Botanical Garden, President Rusby in the chair and 42 members and visitors present.

Miss Caroline R. Dana, of Newark, and Dr. Wilhelm K. Kubin, of New York, were elected to membership.

The meeting was devoted to the exhibition and discussion of the various forms of American violets.

The following persons exhibited living material: A. Cuthbert, Augusta, Ga., *Viola Carolina;* C. D. Beadle, Biltmore, N. C., *V. villosa* and *V. tripartita;* F. M. Rolfs, Lake City, Fla., *V. multicaulis* and *V. Carolina;* President Ezra Brainerd, Middlebury, Vt., *V. septentrionalis, V. Brainerdi, V. LeConteana, V. rotundifolia, V. rostrata* and *V. arenaria;* Geo. E. Osterhout, New Windsor, Col., *V. nephrophylla, V. retusa* and *V. Nuttallii;* Miss F. A. Mulford, Hempstead, N. Y., *V. pedata, V. Mulfordae, V. Brittoniana* and *V. sagittata;* Professor H. H. Rusby, Forest Hill, N. J., *V. villosa, V. sagittata, V. palmata, V. pubescens, V. scabriuscula, V. cucullata* and *V. labradorica;* Miss Lillie Angell, Orange, N. J., *V. Angellae;* Miss Delia W. Marble, Bedford, N. Y., *V. pubescens, V. papilionacea, V. palmata, V. cucullata* and *V. blanda;* Dr. J. Schneck, Mount Carmel, Ills., *V. striata, V. papilionacea* (three forms), and *V. Rafinesquei;* R. C. Schneider, *V. lanceolata;* Percy Wilson, *V. cucullata, V. papilionacea, V. lanceolata, V. rotundifolia, V. scabriuscula, V. pubescens, V. labradorica, V. fimbriatula* and *V. palmata;* Quercus Shafer, *V. palmata, V. cucullata, V. obliqua* and *V. blanda;* and W. W. Eggleston, *V. obliqua, V. palmata, V. sororia, V. cucullata, V. Porteriana, V. fimbriatula* and *V. palmata.*

Extensive herbarium material was also exhibited.

The discussion was opened by Dr. N. L. Britton who spoke of the recent specific differentiations by various authors. He was of the opinion that many of these were doubtful and that while we had perhaps twice as many good species as were recognized in Gray's time, we have only about half as many species as have been proposed. The speaker then gave a general sketch of the group, noting that while preëminently north temperate they extend into the southern hemisphere along the highlands in both the Orient and the Occident. There is only a single endemic and one introduced species known from the West Indies. Mexico furnishes perhaps half a dozen species, and there are numerous species in the highlands of South America. Our violets fall naturally into two habit groups, the acaulescent and the stemmed. A rather common character is the occurrence of cleistogamic flowers, which are borne on horizontal or erect scapes according to the species. The speaker passed the various species in review, paying particular attention to those of eastern North America.

Stewardson Brown, of the Philadelphia Botanical Club, was called upon to review Dr. Britton's remarks. He said that in the main he agreed with Dr. Britton's views of specific validity. He called attention to a form from the vicinity of Philadelphia which Stone recently identified as *Viola septemloba* LeConte, of the *palmata* group, and which the speaker believed to be something different. Attention was directed also to *Viola obliqua*, one of the earliest and most abundant violets in the Philadelphia region. The speaker described the *sagittata-fimbriatula* group as one of the most intergraded and least understood of any of the groups of acaulescent blue violets.

Continuing the discussion, W. W. Eggleston mentioned the occurrence of what he believed to be a hybrid form. He also called attention to President Brainerd's methods of studying violets under cultivation and observing their fruit characters.

L. H. Lighthipe discussed *Viola Angellae*, holding it to be distinct from *Viola palmata*, the differences showing in the character of the flowers and of the summer leaves. Miss Angell, who was present, told of her studies of this species and called

attention to the extraordinary size of the summer leaves. Dr. Rusby in the course of his remarks mentioned a very early form which is apparently the variety *cordata* of *Viola cucullata* of Gray. This form has been studied extensively by Miss Sanial, one of the club members.

Dr. Rydberg spoke of the violets of the Rocky Mountain region, passing in review the various species from that section and directing attention to the occurrence of the common European *Viola biflora*, which reappears in Colorado.

Dr. Shull spoke of the difficulty he had experienced in germinating violet seeds, and in the discussion it was brought out that violet seeds are apt to lose their vitality upon drying.

Dr. MacDougal spoke of the difficulties attendant upon mutation experiments with the violets, and advocated experiments to test any possible theories as to hybrids.

After some further discussion by Dr. Britton and others, this most interesting meeting was brought to a close.

EDWARD W. BERRY,
Secretary.

NEWS ITEMS

Dr. and Mrs. N. L. Britton returned from their European trip on July 15.

We are informed that the death of Mr. Henry Eggert of East St. Louis, Illinois, who was well known as a botanical collector, occurred a year ago last April.

Mr. George V. Nash and Mr. Norman Taylor of the New York Botanical Garden sailed on July 6 to spend several weeks in making botanical collections in Haïti.

It is stated in a recent number of *Science* that Frederick C. Newcombe has been appointed professor of botany, and Charles A. Davis curator of the herbarium at the University of Michigan.

It is stated in the *Stanford Alumnus* that Dr. E. B. Copeland, who has been engaged in botanical work in the Philippines for about two years, has resigned his position there and will return to the United States this summer.

Dr. William C. Coker, professor of botany in the University of North Carolina, Chapel Hill, N. C.; Dr. Raymond H. Pond,

questions of taxonomic nomenclature, which constituted one of the principal ends of the Congress, were carried on under the chairmanship of M. Charles Flahault, director of the botanical institute of Montpellier, France. The consideration of the nomenclature of cryptogams (outside of the Pteridophyta) was referred to a commission to report to the next international congress five years hence. The Congress then proceeded to vote upon various nomenclatorial propositions, following the "Texte Synoptique" arranged and published in advance by Dr. J. Briquet of Geneva, reporter general of the international nomenclature commission. The following *résumé* of the action of the Congress regarding some of the more important principles under discussion has been extracted from a private letter and is subject to official modifications. 1753–1754, as the double initial date for the nomenclature of vascular plants, was approved by a vote of 150 to 19. The proposition to formulate a list of a generic names to be preserved regardless of all rules was favored by a vote of 133 to 36 and the preparation of such a list was referred to a committee. The "Kew Rule" principle, involving the maintenance of the first specific name combined with the accepted generic name, was rejected, but with certain exceptions which were regarded as being so much in the nature of a compromise that only two votes were recorded in opposition to the articles that finally prevailed. Duplicate binomials (*e. g.*, *Taraxacum Taraxacum*) were rejected by a vote of 116 to 72. The idea of fixing the application of generic and specific names by the "method of types" advocated in the "American Code" was not accepted, an alternative proposition being approved by a vote of 106 to 74, many of those who voted with the minority favoring some method of "types" for the future without retroactive provisions. By a vote of 105 to 88, it was voted, in substance, that after January 1, 1908, the publication of a new name must be accompanied by a diagnosis in Latin. The actions of the Congress may be said to be, on the whole, rather encouraging to the optimistically inclined who believe that a few more such international congresses at intervals of five years may result in the establishment of a series of rules of nomenclature which shall be tolerably final and stable.

professor of botany in the Northwestern University School of Pharmacy, Chicago, Ill.; and Howard J. Banker, professor of biology in De Pauw University, Greencastle, Indiana, are devoting parts of the summer vacation to special studies at the New York Botanical Garden.

Mr. Arthur Woodbury Edson, assistant physiologist, Bureau of Plant Industry, United States Department of Agriculture, died suddenly at Waco, Texas, on June 23. Mr. Edson was a graduate of the University of Vermont and was appointed a scientific aid in the Bureau of Plant Industry in 1901. He was engaged in experiments in plant-breeding upon cotton in Texas and had already obtained valuable results in the way of producing early ripening varieties which escape the worst ravages of the boll-weevil and possess other desirable qualities.

Botanical visitors in New York since January 20, not already mentioned in TORREYA, include Dr. C. F. Millspaugh, Field Columbian Museum, Chicago; President Ezra Brainerd, Middlebury College, Middlebury, Vt.; F. V. Coville, C. V. Piper, and William R. Maxon, Washington, D. C.; Dr. R. G. Leavitt, Ames Botanical Laboratory, North Easton, Mass.; Professor E. C. Jeffrey, Harvard University, Cambridge, Mass.; George E. Osterhout, New Windsor, Colorado; C. G. Pringle, University of Vermont, Burlington, Vt.; W. H. Blanchard, Westminster, Vt.; Dr. G. Hochreutiner, University of Geneva, Switzerland; Dr. Anstruther Davidson, Los Angeles, California; Dr. Clifton D. Howe, Biltmore Forest School, Biltmore, North Carolina; Dr. Otis W. Caldwell, Illinois State Normal School, Charleston, Illinois; Dr. George H. Shull, Station for Experimental Evolution, Cold Spring Harbor, N. Y.; Dr. Forrest Shreve, Johns Hopkins University, Baltimore, Md.; Professor William L. Bray, University of Texas, Austin, Texas; and Professor W. L. Jepson, University of California, Berkeley, California.

At the International Botanical Congress held in Vienna, June 12–17, the American botanists in attendance were Arthur, Atkinson, Barnes, Barnhart, Britton, N. L., Britton, E. G., Brown, E., Campbell, Coville, Duggar, Knoche, Perkins, J., Rehder, Robinson, B. L., Shear, Trelease, Underwood. The deliberations upon

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TORREYA

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OBSERVATIONS ON THE FLORA OF THE ISLE OF PALMS, CHARLESTON, S. C.

By W. C. Coker

There has been little done in recent years toward the classification of the coast flora of South Carolina into its component parts, or toward determining the northern limit of a number of subtropical species that reach our shores. Several of our southern states have been or are now being investigated in a rather thorough manner, and it is to be hoped that the useful work of the neighboring states will be extended into South Carolina. Lloyd and Tracy have published on the insular flora of Mississippi and Louisiana; in Alabama, Mohr has completed a valuable botanical survey of the state; and in Georgia, Harper is now working along similar lines. Kearney has published two important papers on the littoral flora of North Carolina, and Johnson has published notes on the flora of Beaufort, N. C. To the northward this work has been extended into New Jersey and Delaware by Harshberger and by Snow. There is little to be found on the littoral flora of Florida except a few notes by Dr. H. J. Webber in *Science*, 1898.

In the hope of adding a little to our knowledge of the distribution of the South Carolina coast flora I took the opportunity while on the way to Florida in 1903 to stop a few days in Charleston and make a survey of the western end of the Isle of Palms. Not until recent years has this island been easily accessible and I know of no botanists who have visited it except representatives of the U. S. Department of Agriculture who collected grasses there a few years ago. The Isle of Palms is in shape somewhat like a ham, with the large end eastward and the west end tapering to a rounded point, which is separated from Sullivan's Island by a narrow channel. The island faces the open ocean

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to the south and is separated from the mainland by wide marshes dotted with a few small islands. The Isle of Palms is about four and one-half miles long and one mile across at the broadest part. The time at my disposal being limited, I did not attempt to study the entire island, but confined myself to the western half. Within this small area, however, there is as great a diversity of ecological conditions as is generally found over a much more extended region. From the few struggling and half-buried halophytes of the beach one may pass over the outer dunes with their grasses and the inner dunes with their palms, then across a narrow marshy strip and into a dense forest of oaks and pines, with trees over forty feet in height — and all within a distance of three hundred yards.

It will probably be best to begin by describing the vegetation as it appears in passing from the shore on the south side to the marshes on the north.

The Upper Beach. — Just above ordinary high tide there is an area of varying width where the sand remains constantly damp and is occasionally flooded by very high water. At places along this narrow strip of damp sand there was coming up an immense quantity of seedling sea-oats (*Uniola paniculata*), which was preparing to hold the sand together for a new line of dunes. Although I have observed shores fringed with sea-oats at various places in North Carolina, South Carolina and the Bahama Islands, this is the first time that I have ever noticed the *Uniola* seeding itself in any quantity. Besides the *Uniola* there was very little else to be found in this strip except an occasional specimen of *Salsola Kali*, *Croton punctatus*, *Atriplex arenaria* and *Amaranthus pumilus*. This is as far south as this interesting species of *Amaranthus* is known to occur.

The Dunes. — Beginning with the low ridges just back of the upper beach, the dunes rise gradually by broken and irregular ridges and knolls until they terminate abruptly in an elevated ridge, sometimes twenty or more feet above sea-level, which is slowly advancing in places to cover and destroy the dense growth in the marshy strip behind it. The tops of the low outer dunes are held by several sand-binding grasses, each of which seems to

dominate particular elevations. *Uniola*, which is most abundant, covers many of the ridges, *Sporobolus virginicus* has possession of others, and *Panicum amarum* and *Spartina polystachya* occur in considerable quantity. Kearney has called attention to a fact just mentioned — that each species seems to have complete control over certain areas and a mixture of several is rarely seen. Excluding the grasses, the vegetation is very scanty. *Croton maritimus*, *Iva imbricata* and *Salsola Kali* are the only species that seem capable of existing here. The *Iva* and the *Salsola* are extremely succulent, the *Croton* less so, but well protected by shining scales. In the depressions behind the outermost dunes, where moisture prevents the sand from being easily disturbed, several other plants appear in addition to the ones just mentioned. *Euphorbia polygonifolia* and *Oenothera humifusa* are not rare in such positions, and the troublesome grass *Cenchrus tribuloides* is abundant. *Leptochloa fascicularis*, a grass that is rather common here, assumes among these outer dunes a very different form from the specimens in more stable soil. Its branches are here long and straggling and of a reddish color, while on the landward side of the island it is much more delicate and turf-like. At certain places the tide makes in between the outer ridges and floods the depressions behind them. On the borders of one of these flooded depressions I was delighted to find a beautiful growth of the trailing tropical sand-strand plant *Ipomoea littoralis* (L.) Boiss., which takes the place here which is generally occupied farther south by the much more common *Ipomoea Pes-Caprae*. In Fig. 1 is given a photograph of this spot with *Ipomoea littoralis* in the foreground. It will be noticed that the tips of some of the long runners are submerged at high tide. As far as I can determine, this is as far north as this plant has been recorded on our shores. The other plants represented in the photograph are *Spartina polystachya*, covering a little knoll in the middle to the left. *Uniola paniculata* in center and left of background, *Panicum amarum* in background to right, and a few clumps of *Salsola Kali* in center to right.

In the somewhat sheltered depressions among the dunes there are also present a few scattered specimens of *Yucca gloriosa*.

About two-thirds of the way back to the inner ridge the tropical palmetto (*Inodes Palmetto*) suddenly appears in abundance and extends backward over the inner dunes (avoiding only the unstable crest where they terminate) into the fresh marsh and the woods behind. The long irregular line of luxuriant palmettoes capping the dunes presents a most attractive picture and gives to this island a clear title to its name. Among the palmettoes

FIG. 1. Strand- and sand-dune vegetation, Isle of Palms, S. C. See page 137.

occur large clusters of the familiar poke-berry (*Phytolacca decandra*). The capacity of this weed to flourish in such unfavorable situations was a surprise to me, and I have not seen it mentioned as a strand plant by others. Scattered here and there on the almost bare sand are clumps of *Salsola Kali* with its succulent spiny leaves and an occasional specimen of *Yucca aloifolia*. Here also was found a little *Physalis pubescens* and the very interesting *Polygonum maritimum*, which in habit and appearance scarcely recalls the other species of the genus. Of the four sand-binding grasses mentioned as prominent on the outer ridges, only *Uniola* extends backward among the palms, but *Cenchrus tribuloides* is everywhere present in dry soil except on the most unstable sand. In certain places the inner ridge was lower and more broken and

in such spots the live oak, *Quercus virginiana*, forms low and contorted thickets, over which twines the yellow jessamine (*Gelsemium sempervirens*).

A photograph of the dunes taken from their inmost edge is given in Fig. 2. In the center of the photograph, between the palmettoes is a large clump of *Phytolacca decandra*; sea-oats (*Uniola*) occupy the ridges in background; in foreground is *Cenchrus tribuloides*. In foreground to left is shown half of a plant of *Salsola Kali*.

As mentioned above, the dunes terminate at this part of the island in a high unstable ridge which is in places being constantly

FIG. 2. Sand-dunes from inmost edge, Isle of Palms, S. C. See text above.

extended landward by the pouring of sand down its inner slope. The inward advance of the dunes, however, has not been sufficient, so far, to cover to any extent the forest behind and produce the "graveyards" of trees that are so conspicuous at some places along our coast.

Even where the sand is in motion, a number of vines nearly always succeed in gaining a position on the incline, and though constantly covered by the moving sands their tips as constantly emerge and continue their growth. The vines that most successfully contended with this shifting sand were *Ampelopsis ar-*

borea (*Cissus bipinnata*), the Virginia creeper (*Parthenocissus quinquefolia*), the poison ivy (*Rhus radicans*) and the wild muscadine (*Vitis rotundifolia*). These would frequently succeed in stopping the sand march, and would then cover its dune slope with a dense mat of green. Other vines also took a part in this struggle: may-pop (*Passiflora incarnata*) with its fine purple flowers and yellow fruits, and *Smilax Bona-nox* were common. In situations where the dune slope had become fixed by vegetation, a number of trees, shrubs and herbs were well established. The live oak (*Quercus virginiana*), red bay (*Persea Borbonia*), and red mulberry (*Morus rubra*) often attained the proportions of trees, and almost reached the top of the dunes. The following shrubs often formed dense clumps in such places: French mulberry (*Callicarpa americana*) with handsome purplish fruits, *Myrica carolinensis* and *Ilex vomitoria*. In Fig. 3 is shown the

FIG. 3. Ridge of sand-dunes with swamp and forest behind, Isle of Palms, S. C. See text below.

ridge of the dunes with the marshy strip and forest behind. To the left a palmetto is being covered by the sand. The vines climbing up the slope around the palmetto are *Ampelopsis arborea*, *Parthenocissus quinquefolia* and *Passiflora incarnata*. The large live oak to the left with its top sheared by the wind is being

slowly killed. The two dead oaks in center were probably killed by an increase in the amount of moisture in the soil. In foreground to right is shown the low vegetation of the marshy strip.

In addition to the trees mentioned above as occurring on the inward faces of the dunes, others may be found in the best protected situations. These are *Quercus laurifolia* (laurel oak), *Salix fluviatilis* and *Juniperus virginiana*. The only fern discoverable here was the ubiquitous *Pteridium aquilinum*.

As the narrow western end of the island is approached the dunes become sharper and higher, the palms disappear, and the forest gradually runs out into a lower hammock growth, disappearing about one mile from the point. The inner faces of these higher dunes are covered with *Uniola*, among which *Strophostyles helvola*, the beach bean, is so abundant as almost to hide the sand. Among these two dominating species there is a good deal of *Croton punctatus* and *Passiflora incarnata*. Behind the dunes at this point there is a long depression, in places slightly marshy, which is covered with a dense mixed coppice of shrubs about ten feet high. The most abundant species here is *Myrica carolinensis*, but with it are red bay (*Persea Borbonia*), cedar (*Juniperus virginiana*), red mulberry (*Morus rubra*) and live oak (*Quercus virginiana*). In places *Smilax Beyrichii* and *Ampelopsis arborea* (*Cissus bipinnata*) form a dense canopy over the shrubs. On the bare ground beneath a good quantity of *Agaricus campestris* was growing. On the edges of the coppice grew *Callicarpa americana*, *Baccharis halimifolia*, *Solanum nigrum*, *Monarda punctata*, *Rubus trivialis* and *Ascyrum stans*.

The Fresh Marsh.— Returning to that part of the island further to the east, represented in Fig. 3, we find behind the inner faces of the dunes a low narrow marshy area in some places covered with several inches of water, in others barely wet. The principal trees of this marshy strip are the old field pine (*Pinus Taeda*), the palmetto, and in places that are only damp, the live oak. The palmetto can grow in quite wet soil and is frequently seen in standing water. *Cornus stricta* and *Baccharis halimifolia* are the principal marsh shrubs, but in places that are not too wet *Myrica carolinensis* also occurs. The following vines are luxuriant here

and cover the trunks of most of the trees: *Ampelopsis arborea*, *Parthenocissus quinquefolia* and *Gelsemium sempervirens*. *Berchemia scandens* is rare. In the shallow water grows *Hydrocotyle ranunculoides*, and on the damp borders are *Lippia nodiflora*, *Diodia virginiana*, *Micranthemum orbiculatum*, *Ludwigia virgata* and *Rubus trivialis*. The fern *Dryopteris Thelypteris* is found in considerable quantity in shallow water. Other herbaceous plants in this area were *Bochmeria scabra*, *Lactuca elongata*, *Polygonum setaceum* and *Bidens frondosa*. A species of *Lechea* was also plentiful. The beautiful malvaceous plant, *Kostcletzkya althaeifolia*, while not seen here, was found in a marshy place further inland.

The Forest.—In the forest which covers the whole interior of the island the trees are of vigorous growth, reaching a height of thirty to forty feet. The pines (*Pinus Taeda*) and oaks (*Quercus virginiana* and *Quercus laurifolia*) are the dominant forms, but a number of other species are more or less plentiful. Large specimens, 40 feet high, of *Juniperus virginiana* were seen, and the following, though not so large, reached the proportions of trees — *Persea Borbonia*, *Ilex opaca*, *Morus rubra*, *Osmanthus* (*Olea*) *americana*, *Celtis occidentalis*, *Prunus serotina*, *Bumelia tenax* and *Salix fluviatilis*. In sandy or damp places the palmetto forms a conspicuous part of the vegetation (Fig. 3). On the oaks the gray moss (*Tillandsia usneoides*) hung in long festoons, while mistletoe (*Phoradendron flavescens*) and the fern *Polypodium polypodioides* were not uncommon on the trees. The undergrowth was made up of the following shrubs, *Laurocerasus caroliniana*, *Callicarpa americana*, *Myrica carolinensis*, *Ilex vomitoria*, *Rhus copallina* and *Fagara Clava-Herculis*. In addition to these, *Osmanthus americana* and *Bumelia tenax*, already mentioned as trees, are more often found as shrubs in the undergrowth. The live oak, too, is frequently low and almost procumbent, forming a large part of the shrubby growth even under large trees of the same species. In the woods as well as near the dunes the woody vines are conspicuous. The yellow jessamine, the poison ivy and the Virginia creeper are abundant. *Berchemia scandens* was not so common. The principal herba-

ceous vines were *Willughbeya scandens*, *Ipomoea speciosa* and *Galactia volubilis*. One specimen of *Vincetoxicum suberosum* was seen. Excluding the grasses the herbaceous undergrowth was very scarce. *Elephantopus carolinianus*, *Eupatorium leucolepis*, *Rubus trivialis*, *Galium hispidulum*, *Opuntia Opuntia* and *Ascyrum stans* were the only species noted. The most abundant grasses here were *Panicum lanuginosum*, *Eleusine indica*, *Sporobolus indicus*, *Uniola laxa* and *Paspalum altissimum*.

The Hammocks.— Just above the pavilion, which is about one and one-half miles from the western end, the forest narrows to a width of about 300 yards and assumes the character of hammocks. The trees become lower, more spreading, and less densely crowded. The dry sandy soil is often almost bare. A little shrubbery appears in scattered clumps, but grasses and vines

Fig. 4. Hammock vegetation, Isle of Palms, S. C. See page 144.

form most of the covering. The trees are principally live oak and laurel oak. Cedar, red bay and palmetto are occasional. The shrubbery is composed in great part of *Fagara Clava-Herculis* and *Ilex vomitoria*, with a little *Laurocerasus caroliniana*, *Bumelia tenax*, *Callicarpa americana* and *Myrica carolinensis*. *Yucca filamentosa*, *Opuntia Opuntia* and *Opuntia Pes-Corvi* appear

in the driest positions. The grasses are *Stenotaphrum americanum*, which is much used in Charleston as a lawn grass, *Cynodon Dactylon*, also a good lawn grass, *Leptochloa fascicularis*, *Sporobolus indicus* and *Panicum lanuginosum*. *Strophostyles helvola* and *Galactia volubilis* are the principal vines. The herbs noted were *Monarda punctata*, *Eupatorium leucolepis*, *Galium hispidulum*, *Bidens frondosa*, *Sanicula canadensis* and species of *Meibomia*. In Fig. 4 is shown a part of this hammock growth. In center is a live oak, with a cedar to left. The shrubs are *Callicarpa* to right, *Fagara Clava-Herculis* in front of oak, and *Myrica carolinensis* to left. In foreground is the grass *Leptochloa fascicularis*, through which is running the vine *Strophostyles helvola*.

The Salt Flats and Marshes.— On the north side of the island the character of the shore varies considerably. Towards the western end there is a low sandy plain just above high-tide mark which is covered with an association of *Iva frutescens*, *Borrichia frutescens* and several species of sedge. A few scattered clumps of *Myrica* project above the general level, and the pretty little *Sabbatia stellaris* adds dashes of color at intervals. Just beyond this sandy plain and separated abruptly from it by a line of drift is a low flat of sandy mud covered at high tide by a few inches of water. This flat is covered with a dense and beautifully level growth of *Borrichia frutescens* and *Sporobolus virginicus* in almost pure association. The *Borrichia* stood about one foot high, the *Sporobolus* about six inches. Among these was a little *Salicornia ambigua* and *Aster subulatus*. This growth ends abruptly and is followed by a dense strip of pure *Salicornia ambigua* about twenty feet wide. Adjoining this, in the black wet mud, commences the extensive marsh-grass (*Spartina patens*) flats which stretch across to the mainland.

Toward the east, the *Borrichia-Sporobolus* flat just mentioned ends rather abruptly in a slightly lower and more muddy area, when the growth changes quickly to an inner strip of *Spartina polystachya* and an outer strip of *Sporobolus virginicus*, both of quite pure growth. At one point on the back beach was noticed a fine lot of *Sesuvium Portulacastrum*.

Around a little garden back of the pavilion were found the following weeds: *Acalypha gracilens*, *Acalypha ostryaefolia*, *Pyrrhopappus carolinianus*, *Sida rhombifolia*, *Amaranthus spinosus*, *Datura Stramonium* and *Physalis pubescens*.

Following is the list of grasses and sedges collected on the island. Most of them were indentified by Professor A. S. Hitchcock, to whom I wish to express my thanks.

Cynodon Dactylon (L.) Pers.
Eleusine indica (L.) Gaertn.
Spartina polystachya (Michx.) Ell.
Panicum virgatum L.
Panicum lanuginosum Ell.
Panicum amarum Ell.
Panicum agrostoides Spreng.
Scleria triglomerata Michx.
Stenotaphrum dimidiatum (L.) Brong.
Phleum pratense L.
Sporobolus indicus (L.) R. Br.
Sporobolus virginicus L.
Fimbristylis spadicea (L.) Vahl
Leptochloa fascicularis (Lam.) Gray
Distichlis spicata (L.) Greene
Syntherisma filiforme (L.) Nash
Paspalum altissimum LeConte
Uniola laxa (L.) B. S. P.
Uniola paniculata L.
Cenchrus tribuloides L.
Spartina patens (Ait.) Muhl.
Cyperus pseudovegetus Steud.
Cyperus esculentus L.
Cyperus Nuttallii Eddy

University of North Carolina,
Chapel Hill, N. C.

SHORTER NOTES

Names of Insects. — It is continually observed, that when entomologists have occasion to refer to plants, they seem to think that "any old name" will do. For example, Dr. H. G. Dyar has in Proc. U. S. Nat. Museum, 1902, an article on larvae of moths found in Colorado. The entomological part of the article is admirable; but some of the references to the plants on which the caterpillars fed are extraordinary. The queerest error occurs on page 409, where *Onosmodium* is metamorphosed into *Pnosmodium*, and a new moth bred from it is actually named *Gracilaria pnosmodiella* by Mr. Busck! Opposed as I am to changing the form of names, I shall feel obliged to refer to this insect as *Gracilaria onosmodiella*. Having admitted the sins o

entomologists (and I myself have sometimes been led astray), I must confess that botanists are rarely observed to err when referring to insects; but this no doubt is because they rarely refer to them. Unfortunately, the July issue of TORREYA, pp. 119–123, contains an article the entomology in which is no better than the botany in the paper cited above. The plant-louse called *Aphis crataegi* may have been *Macrosiphum crataegi* (*Siphonophora crataegi*, Monell, 1879), hitherto known from the Central States, or it may have been *Aphis crataegifoliae* Fitch, or *A. fitchii* Sanderson, or something else. That the ants were the Mexican *Myrmecocystus* (not "*Myrmicocystis*") *melliger* Llave, one may venture to doubt. *Podabrus pruinosus* LeConte (not "*pruniasus*") has long been known to be a synonym of *P. tomentosus* Say. It is *Coccinella*, not "*Coxinella*"; and *Diabrotica soror* is not a ladybird, but is a plant-feeder of the family Chrysomelidae.

T. D. A. COCKERELL.

BOULDER, COLORADO.

A NOTE REGARDING THE DISCHARGE OF SPORES OF PLEUROTUS OSTREATUS. — A few evenings since a friend brought me a fine plant of the above species, consisting of about twenty-five pileoli, growing from a common base and arranged in the form of a large rosette, about twelve inches in diameter and of about the same height. Knowing the plant to be very fresh, not yet forty-eight hours old, I decided to keep it and cook it upon the following day. For the night it was left upon my study table, in the same position in which it grew (gills downward). Early the next morning my attention was called to the plant by my wife who asked me to come and observe it. It happened to be exposed to a very strong morning sunlight, which entered the window three or four feet away. The spores were arising from the plant like tiny spirals of smoke or steam, to the height of two or three feet, making to us a very strange sight. At first I doubted if the "smoke" was really the spores, but after a careful microscopic examination of some which were caught upon a slide this point was definitely settled. Perhaps other agarics spore in a similar manner, but never having had conditions favorable before I cannot say. Certainly the fact was interesting to me and for this

reason I publish it. I have upon numerous occasions observed the momentary expulsion of spores from fungi such as *Bulgaria rufa* and *Sarcoscypha floccosa*, but with these plants the spore-discharge seems to occur when they are first touched, and then only.

C. C. HANMER.

EAST HARTFORD, CONN.,
July 27, 1905.

REVIEWS

Mutants and Hybrids of the Oenotheras*

The literature of mutation grows apace. One of the latest contributions to the subject is a publication of the Carnegie Institution of Washington with the above title. The work is copiously illustrated with many fine half-tone plates and cuts. Professor MacDougal a year or two ago secured seeds of *Oenothera Lamarckiana* and several other mutants from Professor de Vries in Amsterdam. In a carefully guarded and securely enclosed experimental ground at the New York Botanical Garden experiments were instituted to determine the influence of American conditions on the mutants of *Oenothera* secured by de Vries. The results of the work of Professor MacDougal to date constitute the basis of the report herein reviewed.

It was deemed important to establish the original habitat of *Oenothera Lamarckiana* if practicable. During the visit of Professor de Vries to America in the summer of 1904, a visit was paid, in company with the reviewer, to the herbarium of the Philadelphia Academy of Sciences, where a sheet considered to be that of *Oenothera Lamarckiana* was found, the specimen having been collected by C. W. Short near Lexington, Kentucky. The interest of a number of southern botanists was elicited in the search for the plant, but up to the present no living wild plants of *Oenothera Lamarckiana* have been found. In connection with this search, Professor S. M. Tracy rediscovered *O. grandiflora* in the original locality of Bartram. These discoveries, coupled with

* MacDougal, D. T., assisted by Vail, A. M., Shull, G. H., and Small, J. K. Mutants and Hybrids of the Oenotheras. Carnegie Institution of Washington, Publication No. 24. 1905. Papers of Station for Experimental Evolution at Cold Spring Harbor, New York. No. 2.

the experiments described below, indicate that there are two groups of evening primroses in the eastern United States: (1) *O. biennis*, *O. muricata*, *O. Oakesiana* and *O. cruciata*, with comparatively small flowers, in which self-pollination is possible and frequent; (2) *O. argillicola*, *O. grandiflora*, and *O. Lamarckiana* of a southern range and with flowers large and accessory structures favorable to cross-pollination.

The experimental work consisted in growing *Oenothera biennis* in order to observe the changes produced by cultivation. Careful measurements of the plants were made, and it was further established that *O. biennis* is capable of self-fertilization by reason of the superior length of the stamens. A new wild species, *O. argillicola* Mackenzie, was tested and its distinctive characters demonstrated. *O. cruciata* (Nutt.) Small, also, was grown in the experimental grounds, and the evidence at hand seems to confirm the suggestion as to the mutability of the species. It was, therefore, found important by the experimenters, aided by the critical descriptive study of the experimental plants by Miss A. M. Vail and Dr. J. K. Small, to give the characters of the forms of this species secured. Professor MacDougal has also been careful to hybridize *O. Lamarckiana* and *O. cruciata*, as well as *O. Lamarckiana* and *O. biennis*, *O. Lamarckiana* and *O. muricata*, in order to determine by this analysis the relationships between *O. Lamarckiana* and other species of the genus. It was shown that the hybrid progeny in the cultures, made in the New York Botanical Garden and in Amsterdam, included a series of types which ranged, in the aggregate of characters included, from those representing pure strains of both parents through gonecclinic forms to intermediates in which parental characters were, more or less, equally apparent. The experiments show also that the hybrid *O. Lamarckiana* × *O. biennis* includes four distinct and separate forms, none of which is identical with the unilateral monotypic hybrid obtained in the same cross in Amsterdam. Attention was paid to the occurrence of mutants among the hybrids, and with a description of these the first part of the paper closes.

The second part of the publication is a statistical comparison of *Oenothera Lamarckiana* with two of its mutants by Dr. G. H.

Shull, which shows that some of the unit characters of the mutants have a much greater variability than the corresponding features of the parent form, and the greater amplitude of the fluctuations is coupled with a decreased correlation. Thus the coefficient of variability of *nanella* is 31.84 ± 3.16 per cent., while of *Lamarckiana* it is 5.37 ± 0.44 per cent. The greater variability of the mutants does not, however, seem to result in any diminution of the gap that separates them from the parent form, and no movement in this direction has been observed in the long period which has elapsed since the new species came into existence. A bibliography is added.

JOHN W. HARSHBERGER.

UNIVERSITY OF PENNSYLVANIA.

PROCEEDINGS OF THE CLUB

WEDNESDAY, MAY 31, 1905

The meeting was held in the evening at the American Museum of Natural History, President Rusby in the chair and eleven persons present.

A report was received from President Rusby of the favorable action of the Council of the Scientific Alliance on Professor Richards' application for a grant from the Herrman fund. Attention was called also to the movement on the part of the Alliance toward raising a fund of $10,000, the income of which would be used to lighten the present assessments of the individual societies.

A communication from Dr. A. J. Grout, President of the Hulst Botanical Club of Brooklyn, requesting that it be allowed to coöperate with the Torrey Club in the excursions was referred to the Field Committee with power.

The following were elected to membership: Miss Madeline Pierce, Miss Mary McOuat, Miss Anna M. Clark, Miss Clara K. Hicks, Mr. C. C. Doorly, and H. J. Goeckel, Phar.D., New York City; Miss Dorothy Young, Passaic, N. J.; and Norman Taylor, Yonkers, N. Y.

On motion, a resolution was adopted authorizing the member-

ship committee, during the summer interruption of meetings, to receive applications for membership accompanied by the fee, and to accord such applicants all the privileges of regular membership.

The first paper on the scientific program was by Dr. C. Stuart Gager, and was entitled "Preliminary Notes on the Effect of Radio-activity on Plants." Plants grown in the presence of radium are subject to four different influences: (1) the α-rays, composed of a stream of material particles bearing a charge of positive electricity; (2) the β-rays, made up of a stream of particles 1/2,000 the size of those of the α-rays and carrying a charge of negative electricity; (3) the γ-rays, analogous to X-rays, but much more penetrating; (4) the emanation, which in a process of "decay" gives off α-rays as described, and eventually the β- and γ-rays mentioned above. The emanation behaves like a very heavy gas and may be condensed on a solid surface at a temperature of 150° C. The influence of radium upon plants, therefore, is of the nature of radiant energy.

The radium was employed in the form of the salt, radium bromide, of three strengths of activity, 1,500,000, 10,000, and 7,000, enclosed in sealed glass tubes; and also in the form of celluloid rods and cylinders covered with Lieber's radium coating of 10,000 and 25,000 activity. The glass shuts off practically all the α-rays; the β-rays penetrate through the glass more easily, while the γ-rays pass through glass very readily. By the use of the coated rods and tubes all three kinds of rays as well as the emanation are available.

The experiments indicate that the rays act as a stimulus, which varies in intensity with the strength and amount of radium used, the thickness of the seed-coats, distance of exposure and the intervention of moist soil between the radium and the plant. If the stimulus ranges between a minimum and an optimum, germination and subsequent growth are accelerated. Within these limits the rate of alcoholic fermentation is at first increased, but continued exposure may result in over-stimulation and consequent decrease in rate.

By over-stimulation, germination and growth of seeds, gemmae of Hepaticae, and pollen-grains are retarded and may be com-

pletely inhibited. Under the influence of the rays, chloroplasts change their position in the cell, as under too intense illumination, and they are eventually destroyed, as is embryonic tissue in stems and roots.

Results similar in kind to the above are obtained by the use of radio-tellurium in a sealed glass tube. The influence here is confined chiefly to the α-rays. Experiments with a rod coated with pollonium, which gives off α-rays exclusively, have thus far given negative results.

Growth is retarded and may be inhibited by growing plants in an atmosphere containing the radium emanation, such as may be drawn from a cylinder lined with Lieber's coating.

Photographs of the experiments, and specimens of the various radio-active preparations were exhibited. The paper was the occasion of considerable discussion. The second paper entitled "Some interesting Plants from Colombia" was by Dr. H. H. Rusby.

In view of the lateness of the hour Dr. Rusby stated that he desired to reserve his paper, as planned, for some future meeting when he could take the time to treat it more adequately, and for the present he would show some of the more interesting specimens and comment briefly upon them.

The collections were made by Herbert H. Smith, who spent four years collecting in the United States of Colombia near the town of Santa Marta, which is about fifty miles from the coast in the Sierra Nevada mountains. Although this territory was collected over quite extensively by Karsten, whose collections are at St. Petersburg and consequently not readily accessible, and by Wm. Purdy and various orchid collectors, Mr. Smith's efforts disclosed many novelties.

The total collection studied contained about 3,000 numbers, embracing between 2,300 and 2,400 species, of which number about fifteen per cent. are likely to prove new to science.

The specimens exhibited were most interesting, embracing arborescent Violaceae, handsome twining Bignoniads and Senecios, showy Vacciniaceae, numerous anomalous Compositae, and many other things unfamiliar to collectors in temperate climes.

Adjournment followed.

EDWARD W. BERRY,
Secretary.

THE BOTANICAL SYMPOSIUM AT OHIO PYLE, PENNSYLVANIA

The second Botanical Symposium, held at Ohio Pyle, Pennsylvania, during the week of July 2 to 9, as announced in previous numbers of this Journal, was voted a great success by the thirty persons in attendance. That we should come so far was well appreciated by our Pittsburgh friends, who, although concentrating their efforts on "Pittsburgh Day," did much toward the general success of the meeting. Especial credit in this connection is due to the young ladies, some of whom seemed none the less attractive on account of their botanical innocence.

Ohio Pyle is a small village at an altitude of about 1,200 feet, situated among the western ranges of the Alleghany Mountains on the Youghiogheny River at a point where that tortuous stream almost forms a loop on itself by turning abruptly nearly backwards and after a course of several miles comes to within a few rods of the point of departure, but some 80 feet nearer sea-level; in this distance it tumbles over a very pretty "falls" and traverses a series of mad rapids, the rocky banks of which are frequently inundated for short periods. The sandy pockets of these banks are exceedingly rich in plants, many of them of great interest and often of southern affinities.

The more precipitous places are covered by a mass of *Rhododendron maximum*, at this time gorgeous in its profusion of bloom. The so-called peninsula formed by the bend of the river is a low flat forest of oak and chestnut, with a goodly number of cucumber and tulip trees interspersed and an occasional white pine and hemlock on the margin. Here many interesting plants are found but at this time the forest was especially attractive to the mycologists on account of the richness of its fungus flora, which had been brought out by the copious rains of the previous weeks. The steep and rocky mountain-sides and the brooklets on the opposite sides of the river furnished much additional variety.

The most interesting trees were the Alleghany birch, cucumber tree and Pennsylvania maple; of shrubs, there were *Pyrularia*

pubera, *Spiraea virginiana*, *Ilex monticola* and *Dirca palustris*. Herbaceous plants of interest were *Arisaema Stewardsonii*, *Cimicifuga americana*, *Aconitum uncinatum*, *Trautvetteria carolinensis*, *Ranunculus alleghaniensis*, *Adlumia fungosa*, *Heuchera Curtisii*, *Saxifraga micranthidifolia*, *Dalibarda repens*, *Scutellaria saxatilis*, *Houstonia serpyllifolia*, *H. purpurea* and *Marshallia grandiflora*; among the pteridophytes, *Camptosorus rhizophyllus*, *Asplenium pinnatifidum*, *A. montanum* and *Lycopodium tristachyum*. The violaists found much of interest, but the crataegists saw very little in their line except a type bush of one of Mr. Ashe's species. The bryologists were overwhelmed with the abundance and variety of their favorites. The mycologists were simply deluged with species and individuals, but lichens were very scarce and algae almost entirely absent. A full list of the plants noted is to be published by Recorder Crawford at a later date.

The headquarters, the Rainier Hotel, an ancient summer resort with an air of abandonment quite suitable to the occasion, was all that could be wished for, especially as we were in advance of the season and had the place practically all to ourselves. The large pavilion in the grove was provided with a musical instrument and an abundance of tables and chairs—this was taken advantage of by the mycologists, who installed a "mushroom exhibit" in which about seventy-five species were shown under proper labels. Here, too, in the open, in fact right in the forest, our evening meetings were held; these should be attended to be appreciated,—their instructiveness, informality and mirth are beyond my poor descriptive power. Refreshments, from a mysterious source, such as candy, lemonade and ice-water were frequently passed around, while the absence of the mosquito was remarked by our friends from New Jersey. Our disappointment, however, was the failure of the mycological contingent to "make good" their "mushroom feast."

The peculiar success of these meetings is to be attributed, beyond a doubt, to their total lack of formality — the only vestige of which was due to a conspiracy of the "inner man" and the hotel management, which required that each one should report at the dining hall, in person and at stated intervals, but we know of

no instance in which that was particularly objected to. On the whole, this meeting seemed to demonstrate that a considerable party could go on a week's herborizing, in quest of recreation, with as much success as if hunting, fishing or lounging at the seashore. It showed that a widening of the scope of territory covered was thoroughly practicable. It indicated that the symposium as the occasion of a mid-summer gathering or reunion of botanists is now assured and it proved that an absolutely informal gathering is not only most desirable but eminently successful.

It was decided to hold the next meeting somewhere in the highlands of New York, so as to make it practicable for the New England botanists to avail themselves of an invitation to join us, and it is predicted that next year's symposium will prove even a greater success ; at all events we all promised ourselves to be on hand in 1906.

J. A. Shafer.

NEWS ITEMS

J. Franklin Collins was appointed assistant professor of botany in Brown University at a meeting of the corporation of that institution held on June 22, 1905.

Dr. George T. Moore has resigned his position as algologist and physiologist in charge of the laboratory of plant physiology, Bureau of Plant Industry, U. S. Department of Agriculture.

Mr. Otis W. Barrett has resigned his post as entomologist and botanist of the Porto Rico Agricultural Experiment Station and has been appointed "plant introducer" in the Bureau of Plant Industry, U. S. Department of Agriculture.

Dr. John Hendley Barnhart, editor-in-chief of the publications of the Torrey Botanical Club, who attended the recent International Botanical Congress at Vienna as delegate from the New York Botanical Garden, returned to New York on August 2.

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TORREYA

September, 1905

ORIGIN OF RHUS BIPINNATA

By Edward L. Greene

From the annals of botany and of horticulture a list of some length might be made of so-called varieties of trees and shrubs, each differing from its specific type by more or less deeply cut or cleft leaves or leaflets; and the varietal name *laciniata*, by the way, is almost uniformly employed to designate this kind of morphological aberration. One meets with it in genus after genus, and it is found associated with the mutations of more than one species within the same genus, as in the case of *Rhus*, when we have *Rhus glabra laciniata*, and an earlier *Rhus typhina laciniata*.

Heretofore this not unusual type of variability has not seemed significant to botanists, if one may judge by the brief and slighting allusions made to them in our books of botany, where they are apt to be treated as if not deserving varietal names; so that for any even half-adequate account of them one must consult books or journals of horticulture — this even in the case of *Rhus bipinnata*, which originated not under cultivation, but was found wild in the woods of eastern Pennsylvania; a shrub so widely at variance with its nearest allies that the finder did not even guess it to be a *Rhus* at all.

In the light of the mutation theory, newly advanced and already meeting with wide acceptance, the class of morphologic deviations to which this fine sumac belongs attains a new significance. Every such plant deserves from systematic botany better treatment than that of being passed by without a name.

In the heading of these notes I shall seem to have promised an account of the origin of the form under consideration. But my meaning is rather to indicate how far we are from knowing how the shrub originated; hoping, however, to incite those living

[No. 8, Vol. 5, of Torreya, comprising pages 135–154, was issued August 26, 1905.]

near its original habitat to make, if it be not too late, a thorough investigation of the matter.

The earliest mention I find made of this sumac in any book of botany is that by Darlington,* who gives an excellent description of its characters, as far as known ; and this is the most respectable mention I find of it in any flora. The locality where it was found is within the limits of Chester County, where Darlington lived ; but it does not appear that he ever sought it out in its wild state. Its discoverer was Mr. Kilvington, concerning whom I obtain the information through Mr. Meehan : "Concerning Robert Kilvington ; our Mr. Joseph Meehan recalls him perfectly and says that he lived on Woodland Avenue, West Philadelphia. He and his generation, however, have passed away. Kilvington was a botanist of considerable local note, and his attainments were highly appreciated by those who knew him. He was a private gardener for a time near Philadelphia, later going into business for himself as a florist." †

According to the late Thomas Meehan ‡ Mr. Kilvington must have cultivated and propagated his fine discovery, though into southern Europe, where it was greatly prized, it was introduced by the botanist Elias Durand, of Philadelphia ; § and ten years after it was first described, but namelessly, by Darlington, Carrière named and described it as *Rhus glabra laciniata*. Only a few of the leaflets in even Carrière's figure are properly laciniate, most of them being pinnately divided, so that the foliage as a whole is, as Darlington said, bipinnate ; and in the considerable number of herbarium specimens now before me, from various gardens, all the leaves have pinnate leaflets, none being merely laciniate.

It is of touching personal interest to know that this beautiful mutation has been planted at the grave of Dr. Darlington, who gave the earliest account of it ; for I find, in the herbarium that belonged to the late M. S. Bebb, and which is now the property

* Flora Cestrica, 3d Ed., 457. 1853.

† S. Mendelsohn Meehan in litt., Aug. 22, 1905.

‡ Gardener's Monthly 18 : 355.

§ Carrière, Rev. Hort. 1863 : 7.

of the Field Columbian Museum, a large leaf of it, the sheet on which it is mounted bearing the following legend in Mr. Bebb's hand:

"In September, 1863, I made an excursion to the pine barrens of New Jersey and far down along the eastern shore of Maryland, my companion and very helpful guide to localities of special interest being my friend William M. Canby. Together we visited the grave of Dr. Darlington, and finding this shrub growing upon it, I took a single leaf as a memento." *

It seems as if it would be a worthy undertaking on the part of some of the botanists of eastern Pennsylvania to investigate this shrub, so interesting as to the problem of its derivation. It would certainly be well to explore its original habitat, or any other that may chance to have been recorded, with a view to determining whether it seems to have originated as a seedling from *R. glabra* or as a mere offset from another individual.

I find no record in either botany or horticulture of the shrub's having borne flower or fruit; but in the National Herbarium we have a specimen communicated long ago by Mr. Commons, of Delaware, which bears a panicle of immature fruit. This sample was taken from a cultivated specimen, but where it was grown is not indicated.

U. S. National Museum.

NEW FASCIATIONS

By J. Arthur Harris

Perhaps the most common of all structural anomalies is that known as fasciation. Occurring in so many forms as it does, it is familiar to everyone and requires no description. In some species, as in the sweet potato and the coxcomb, it is to be observed with such frequency as to almost deserve the designation of a varietal characteristic.

The following cases of fasciation, most of which are not described in Penzig's admirable compendium of vegetable teratology,

* Herb. Field Mus., sheet 14074.

have come to my notice and are presented in the thought that they may have a statistical value.

The anomaly is very frequent in the inflorescence of *Ambrosia trifida* and *A. bidentata*, usually leading to a terminal division of the inflorescence.

In two specimens of *Centaurea Moschata*, pronounced fasciation of the stem was noticed, beginning near the base and extending to the tip. In one case the stem reached the breadth of about five-eighths inch. At the top was produced an inflorescence which was necessarily much convoluted, forming more than one complete turn and having a length of nearly five inches (taking the measurement at the contracted portion of the involucre, the narrowest portion of the head, and not from the tips of the expanded florets) as compared with a width of about a quarter of an inch, the thickness of the head being slightly over one-half inch. The second case was very similar in nature, but the phenomenon was not so marked. Penzig gives for *C. nigrescens*: "Eine Art Fasciation der Stängelspitze, mit drei verschmolzenen Inflorescenzen ist * * * erwähnt." De Candolle in his Organographie Végétale, figures a fasciated stalk of *C. Scabiosa* bearing at the tip two distinct and apparently normal inflorescences. The present inflorescences were apparently normal except for their greater diameter in one direction.

Slight fasciation of the stem was noticed in *Corcopsis tinctoria atropurpurea*.

In the herbarium of the Missouri Botanical Garden is a fine fasciated specimen of *Dioscorea divaricata* collected on the grounds in 1898 by Mr. J. B. S. Norton. Brongniart * records the fasciation of the whole climbing stem of this species. Penzig gives other examples of torsion and fasciation.

A head of *Helianthus* sp. sent from Florahome, Fla., by T. Tilden, Jr., shows a broad fasciation of the head and of the stem for some distance. Fasciation in *Helianthus* has several times been noted in the literature.

Several more or less extensively fasciated stalks of *Hibiscus Moschatus* were noticed in a group of plants cultivated in the Missouri Botanical Garden and in Tower Grove Park.

* Bull. Soc. Bot. France 12: 49. 1865.

Fasciation of the stem in the Convolvulaceae has been several times noted in the literature. I have seen it in *Ipomoea pandurata* and in the sweet potato, where it may almost be regarded as a normal occurrence.

Conard * has published detailed observations on the phenomenon. He attributes the first published notice to Macfarlane,† apparently not being aware of the much earlier observation of Fermond,‡ who describes a fasciation of one meter in length and ten to twelve centimeters in width.

Fine examples of fasciation were noticed in sprouts from the stump of a tree of *Melia Azedarach* ten or fifteen feet in height which had been winter-killed the preceding winter. Fasciation has already been described for this species.

It is hardly necessary again to record branching of the spike of *Plantago lanceolata.*

Dudley § states that the spike of *Plantago Rugelii* is frequently fasciated at the tip and Gerard || records more or less branched spikes. I have frequently noticed spikes which were fasciated or in which the fasciation had extended to apical branching.

Fasciation of the stem was noticed in a vigorous young plant of *Rhus typhina.* Penzig records fasciation in the twig of *R. glabra.*

The leaves of *Silphium trifoliatum* are described as in whorls of three or four. One bed of plants in the Missouri Botanical Garden showed leaves arranged largely in whorls of five, those of three and four being found much less frequently. Some of the stems were markedly fasciated toward the tip. One stalk of *Silphium integrifolium* with 3-whorled leaves was found at Meramec Highlands.

Fasciation in the stem is again noticed in *Spinacia oleracea.* Marked fasciation of the stem of *Stephanotis floribunda* was noted for me by Mr. G. E. McClure. Fasciation of the spike of *Ver-*

* Conard, H. S. Fasciation in the Sweet Potato. Contr. Bot. Lab. Univ. Penn., 2: 205–213. *pl. 19.* 1901.

† Macfarlane, J. M. Science II. 5: 940. 1897.

‡ Fermond, Ch. Essai de Phytomorphie, 1: 299, 301. Paris, 1864.

§ Dudley, W. R. The Cayuga Flora. Bull. Cornell Univ. 2: 64. 1886.

|| Gerard, W. R. Bull. Torrey Club 7: 67. 1880.

bena stricta with sometimes a division into two similar branches was not uncommon during August, 1902.

A fasciated specimen of *Vernonia angustifolia* is preserved in the Missouri Botanical Garden herbarium.

The Library, Missouri Botanical Garden.

NOTE ON BOTRYCHIUM VIRGINIANUM (L.) SW.

By Ivar Tidestrom

The species of *Botrychium* often present interesting modifications of their normal form; they seem to vary as to form between very wide limits and their variations appear to be independent of climatic or other conditions. This became obvious to me while out on a collecting trip along the western shore of Chesapeake Bay, some thirty miles east of Washington. Along with typical forms of *B. virginianum* grew the slender form described by Pursh under the name of *B. gracile* [Pursh, Fl. Am. Sept. 2: 656. 1814]. Some very large plants were also found, one of which is nearly 5 dm. high. Plants of this size are often found in the shaded ravines in the Potomac basin, which region appears to be a choice locality for this species. The most interesting form, however, was discovered among a number of normal plants at Chesapeake Beach, Md. It is represented in Fig. 1. Only one specimen was discovered; it proved interesting in having two fertile pinnules on the sterile segment — a case which is rarely met with in this species; the forking sporophyll and the two normal panicles are also interesting. Mr. Homer D. House informs me that the latter deviation from the normal form is not so rare.

As this species is very common in low woodlands, it is within easy reach of botanists and is well worthy of study. Some interesting data might be gathered and added to the history of this, our finest species of *Botrychium*.

Of other species, the following have been recorded as occurring within the limits of the Washington Flora: *B. neglectum* Wood, of which a single plant was discovered by Mrs. E. S.

FIG. 1. A form of *Botrychium virginianum*.

Steele, within four miles of this city ; *B. dissectum* Spreng. is frequent in rich woodlands ; *B. obliquum* Muhl., occurring in low damp woods, is not so common.

I am indebted to Messrs. R. V. Bailey and H. Hungerford for the photograph of *B. virginianum.*

Washington, D. C.,
May 29, 1905.

SOME LARGE SPECIMENS OF SMALL TREES IN GEORGIA

By Roland M. Harper

Two winters ago while collecting timber specimens in Georgia I came across some unusually large examples of four species which are ordinarily shrubs. The following notes on them may be of interest.

Rhus copallina L.

About two years ago * I reported the occurrence of arborescent specimens of this on the banks of the Chattahoochee River in Early County near Saffold, at or near the inland edge of the Lower Oligocene region of the coastal plain. In February, 1904, I revisited the spot and found more of them (the fact that there are almost no evergreens on alluvial banks in that part of the country making it easier to see the trees in winter). The trunk of the largest specimen observed was eleven inches in diameter near the base, but as it forked about three feet from the ground (see Fig. 1) I had to select a smaller one for the collection. The largest specimens averaged about thirty feet tall.†

On March 26 I saw along the bluff of McBean Creek in the southeastern corner of Richmond County a specimen of *R. copallina* which I estimated to be forty feet tall. Its trunk was only six inches in diameter.

* Bull. Torrey Club 30 : 291. 1903.

† I looked in vain for the large specimens of *Aralia spinosa* which I had seen near the same place in 1901, and was afterward informed that the demand for the bark ("prickly-ash bark") as an ingredient of some patent medicine had caused their destruction between my two visits.

Rhus glabra L.

This does not seem to be classed as a tree in any of the books. In December, 1903, I frequently found specimens over three inches in diameter and twenty feet tall growing on the Cambrian shales along the Oostanaula and other streams in Gordon County, and on January 5, 1904, I found on the same formation, in a cane-brake on the bank of the Coosa River, in Floyd County, about twelve miles below Rome, veritable little grove of this species, in which many of the specimens were as much as seven inches in diameter and thirty feet tall, with the lowest branches higher up than I could reach. These trees seemed perfectly sound and healthy, and I cut a log from one of them which astonished even the natives who saw me wrapping it up for shipment.

Fig. 1. Trunk of *Rhus copallina*, 11 inches in diameter. Early County, February, 1904.

This species is readily distinguished from *R. copallina* in winter by several characters which are rarely if ever mentioned in descriptions. These characters may be contrasted as follows:

R. glabra	*R. copallina*
Heart-wood deep yellow, sharply distinguished from the narrow white sap-wood.	Heart-wood pale greenish-yellow, not sharply distinguished from the sap-wood.
Fruiting panicles erect.	Fruiting panicles drooping.
Drupes bright scarlet.	Drupes dull dark-red.

There are also some differences in the bark, almost impossible to describe.

The natives in northwest Georgia commonly call *R. glabra* "red sumac" and *R. copallina* "black sumac," doubtless on account of the difference in color of the fruit.

Ilex myrtifolia Walt.

In the swamp of the Suwannee River (rather an unusual habitat for it) in Clinch County I noticed in February, 1904, some specimens of this handsome little tree about thirty feet tall, with trunks a foot in diameter, though this species has not hitherto been recognized as a member of our sylva. During the same winter and following spring I noticed other arborescent specimens of it, in pine-barren ponds, in Sumter, Berrien, Lowndes, Clinch, Ware, and other counties in the coastal plain.

A characteristic feature of this species is that its trunk is never strictly erect, but always ascending or curved.

Staphylea trifolia L.

This too does not seem to have ever been credited with becoming a tree. On January 7, 1904, I found one specimen on the right bank of the Etowah River in Floyd County about four miles above Rome, on the Knox Dolomite (Lower Silurian) formation, which had a straight erect trunk five or six inches in diameter, with the lowest branches about six feet from the ground. There were a few shrubby specimens of it near by, but apparently no other arborescent one.

Specimens of these four little trees formed part of Georgia's exhibit at St. Louis last year, and are now presumably in the forestry collection in the state capitol in Atlanta.

College Point, New York.

COTYLEDON- AND LEAF-STRUCTURE IN CERTAIN RANUNCULACEAE

By Neata Clark

This paper covers a brief study of the leaves and cotyledons of four of the *Ranunculaceae*, viz.: *Aquilegia coerulea* James, *Anemone multifida* Poir., *Pulsatilla hirsutissima* (Pursh) Britton,

and *Oxygraphis Cymbalaria* (Pursh) Prantl. The work was done at the suggestion of Professor Francis Ramaley.

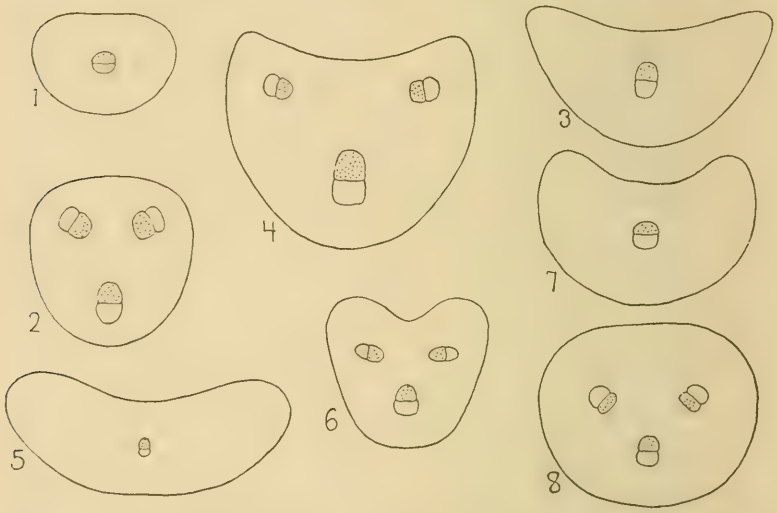
The cotyledons in the four species examined are all more or less ovate in outline, being of the usual Ranunculaceous type. The leaves in the first three species are much cut and divided while in *Oxygraphis* they are cordate-ovate with much branched veins. In no case does the cotyledon resemble the leaf in form. In *Oxygraphis Cymbalaria* the cotyledon-stalks are connate from their bases almost to the blades.

No constant difference of striking character was noticed in the epidermis of cotyledons and leaves. However, it was seen that the number of stomata was much smaller for a given area of cotyledon than for a similar area of leaf surface. No stomata were seen in the upper epidermis of either leaf or cotyledon of *Aquilegia coerulea*. "Twin stomata," *i. e.*, stomata in contiguous pairs, were seen in the lower epidermis of both leaf and cotyledon in this species. In the literature at hand there seems to be no mention of this peculiarity as having been noted in Ranunculaceae. Long, simple hairs occur on the under surface of the cotyledon of *Pulsatilla hirsutissima* and on both surfaces of the leaf.

In the internal structure of leaf and cotyledon the one-row palisade is characteristic of all, the single exception is the cotyledon of *Oxygraphis* in which the palisade might be described as two-layered. The spongy tissue of the cotyledons corresponds to that of the leaves, especially in the shape of the cells and in the size of the air-spaces. The vertical sections, excepting in *Pulsatilla hirsutissima*, showed about the same thickness, but in that species the cotyledon was about twice as thick as the leaf. This difference in thickness is brought about by the greater size of the cells in the cotyledon.

The leaf-petioles are quite different from the cotyledon-stalks in the four species. Figures 1 to 8, which are diagrams of cross-sections, show these differences plainly. In each case the leaf-petiole is somewhat cylindrical with about three vascular bundles while the cotyledon-stalk is more flattened and has only a single small bundle. Figures 1 and 2 are of *Aquilegia coerulea*, figures

3 and 4 are of *Anemone multifida*, figures 5 and 6 are of *Pulsatilla hirsutissima* and figures 7 and 8 are of *Oxygraphis Cymbalaria*. As above noted, the cotyledon-stalks in the last-named species are connate for nearly their entire length. This species should, therefore, be added to the list* published by Miss Sar-



FIGS. 1–8. Sketches illustrating cotyledon- and leaf-structure in *Aquilegia*, *Anemone*, *Pulsatilla*, and *Oxygraphis*.

gant, of plants in which the cotyledon-stalks form a petiolar tube.

On the whole, it may be said that while there are slight differences in the epidermis of cotyledons and leaves and in their internal structure, yet the greatest differences are in the leaf-petioles and cotyledon-stalks. The differences, recorded here for these species of Ranunculaceae, are on the whole, much the same as those previously noted in other plants by Ramaley.†

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BOULDER, COLO.

* Annals of Botany **17**: 73. 1903.

† Minn. Bot. Studies **2**: 417. 1900; also, University of Colorado Studies **2**: 255. 1905.

SHORTER NOTES

LESPEDEZA VELUTINA BICKNELL A HOMONYM. — Instances are not rare in which a homonym is published so soon after the first use of the name that the occurrence can scarcely be laid to negligence on the part of its author in selecting a valid name. The following case appears to be one of such instances.

Lespedeza Bicknellii nom. nov.

Lespedeza velutina Bicknell, Torreya 1 : 102. 28 S 1901. Britton, Manual 1048. O 1901 ; ed. 2, 1068. 1905.

Not *Lespedeza velutina* Dunn ; Hooker, Icones Plantarum 7 : *pl. 2700.* F 1901. A native of China.

The type of *L. velutina* Bicknell and therefore of *L. Bicknellii* is, "from Woodlawn, N. Y. [E. P. Bicknell], August 28, 1898, flowers ; September 25, 1898, fruit : in the herbarium of the New York Botanical Garden." H. D. HOUSE.

WASHINGTON, D. C.

REVIEWS

English Edition of Goebel's Organographie der Pflanzen*

The English form of Professor Goebel's important work, which has been awaited for several years, has at last been completed, and the second part is now issued and is the most recent publication of classical botanical productions which the Clarendon Press has given to the English-speaking world. While the discrepancy of time between the appearance of the second part in the two languages is rather long, we remember that the translation has been a task of no mean magnitude.

The botanists of the present moment are at a point in the history of their science which is unique. Looking backward we may see that, at the beginning of what we may call modern botany, all its students trod the same path. During this period the science was purely descriptive of the externals of the plant

*Organography of Plants, especially of the Archegoniatae and Spermophyta, by Dr. K. Goebel, Professor in the University of Munich ; authorized English edition by Isaac Bayley Balfour, King's Botanist in Scotland. Part I., General Organography, i–xvi + 1–270, *f.* 1–130. 1900. $3.10 ; Part II., Special Organography, i–xxiv + 1–708, *f.* 1–417. 1905. $7.00 ; royal 8vo. Oxford, Clarendon Press.

organism. Occasionally, men in other fields of scientific work attempted to solve some of the riddles of internal structure and of physiology, but when they claimed admission to the ranks of the botanists they were regarded as interlopers. Botany remained for a time a virgin science, whose fecundity was revealed only after union with physics and chemistry. From the time when the botanist accepted the wider definition of his science, the original path became divided at first into two, one of which was directed toward the goal of physiology and the other toward that of description. The latter trend of study led to the necessity of common descriptive terms and of this necessity was produced a morphology which culminated in classification of plant parts by referring them to a "few elementary forms" which forms, however, have a subjective reality only. This is the idealistic morphology of Goethe, which in its time served well its purpose. The "uniformity" of life discovered by this morphology was a conception which prepared the mind for the theory of descent, under which the variety of organic life could be subsumed. It soon overleaped itself, however, and became a mere formalism. The plasticity of nature was lost sight of in the rigidity of subjective conceptions. So markedly true has this been in some quarters, that the belief is held to with a tenacity which would be more praiseworthy if exerted in a better cause, that the sole business of morphology is to say that things are so rather than how they come to be so. There are certainly two ways of viewing an organ. We may look at it simply as such, restricting our legitimate curiosity, and contenting ourselves with a mere description of it; and then we may search about in the limitless field of observation, and when we find a similar form, seize upon it, and with a sigh of satisfaction, call it a homology, thinking our task done, much as a curiosity collector does in finding a particular object of his cupidity. Or we may see in form a measurable expression of forces at work in the living organism; we may by experiment get at some more adequate notion of its service in the economy of the plant; we may by searching find out why similar forms are produced in different organisms and why in similar organisms, different structures are

produced; in this way we may get at some conception of why the plant is as it is. These are the real aims of causal morphology. "Even if we had the story of development spread out clearly before us, we could not content ourselves with the simple determination of the same; for then we should be constrained to ask ourselves how it has been brought about." In the realm of plant morphology, therefore, the point of view of physiology helps us to see that by the method of causal morphology we may ultimately attain to the knowledge which we seek.

The chief prophet of causal morphology is Goebel, and the "Organography" is his prophecy. There are few books so rich in observation and so suggestive of discovery as his. The sharp delimitations drawn between our knowledge and our ignorance, the fearless denunciation of self-delusion, make this task well worth the sustained effort which it cost the author. It will be most regrettable, now that the results are available in English as well as German, if the coming years do not bring a harvest to the master workman. We believe that no book of the present day is of deeper significance for the development of botanical knowledge. We can only feel a certain disappointment that the task became, in its latter part, so very great that the author was compelled, by circumstances, some of which were beyond his control, to curtail a portion which would have been of much greater value if it had been treated more at length.

F. E. Lloyd.

NEWS ITEMS

The September *Journal of Botany* announces that owing to ill health Mr. George Murray has resigned the keepership of the Department of Botany of the British Museum.

Dr. and Mrs. N. L. Britton, of the New York Botanical Garden, and Mr. Stewardson Brown, of the Academy of Natural Sciences of Philadelphia, were in Bermuda for the first three weeks of September.

Mr. Edward W. Berry, secretary of the Torrey Botanical Club, has removed to Baltimore, where he will be engaged in palaeobotanical work for the Maryland Geological Survey, with headquarters at Johns Hopkins University.

Professor Ellis A. Apgar, for twenty years state superintendent of public instruction of New Jersey, and one of the authors of "Apgar's Plant Analysis," died in East Orange, N. J., on August 28, at the age of seventy years.

Dr. W. A. Murrill of the New York Botanical Garden, and Mr. P. L. Ricker of the Bureau of Plant Industry, U. S. Department of Agriculture, devoted a month in August and September to the collection and study of fungi in the Mt. Katahdin region of Maine.

Dr. Burton E. Livingston of the Bureau of Soils, U. S. Department of Agriculture; Dr. Forrest Shreve of Johns Hopkins University, and Professor Elias J. Durand of Cornell University, have recently spent a few weeks in special studies at the New York Botanical Garden.

Professor L. M. Underwood, of Columbia University, returned from his summer's visit to Europe on September 18. After attending the International Botanical Congress in Vienna, several weeks were given by him to the study of the fern-collections at Prague, Berlin, Paris and Kew.

Professor Francis E. Lloyd, of the Teachers College, Columbia University, returned to New York late in August after a summer's work at the Desert Botanical Laboratory of the Carnegie Institution at Tucson, Arizona, where he was engaged chiefly in a study of transpiration of xerophilous plants.

Dr. C. Stuart Gager, recently assistant in the laboratories of the New York Botanical Garden and acting professor of botany in Rutgers College, New Brunswick, New Jersey, has accepted an appointment as teacher of biology in the Morris High School, Borough of the Bronx, New York City.

Mr. George V. Nash of the New York Botanical Garden, returned on September 8 from a six weeks' visit to Haiti, bringing with him a large quantity of herbarium material, living plants, seeds, etc. On the return voyage ten days were spent on the Grand Turk of the Turks Islands group, where Mr. Norman Taylor, who accompanied Mr. Nash, remained for two weeks longer.

Vol. 5 No. 10

TORREYA

October, 1905

NOTES ON THE GRAY POLYPODY

By Ivar Tidestrom

Marginaria polypodioides (L.)

Acrostichum polypodioides L. Sp. Pl. 1068. 1753.

? Polypodium virginianum L. *l. c.* 1085. [Syn. Plumier only.]

? Polypodium ferruginosum L. Sp. Pl., ed. 2, 1525. 1763.

Polypodium incanum Swartz, Prodr. 131. 1788.

Polypodium ceteraccinum L. C. Rich ; Michx. Fl. 2 : 271. 1803.

Goniophlebium incanum J. Sm. Jour. Bot. 4 : 56. 1841.

Lepicystis incana J. Sm. Cult. Ferns, 2. 1857.

Polypodium polypodioides A. S. Hitchc. Rep. Mo. Bot. Gard. 4 : 156. 1893.

The history of this little fern, its variations in form, and its geographical distribution, are of great interest to botanists.

The plant was without doubt first recorded by Plukenet [Phytogr. *pl. 89. f. 9.* 1691] under the name *Filicifolia s. Polypodium tenuifolium minus Virginianum*, and later enumerated in Almag. Bot. 153. 1696. Plukenet cites as a possible synonym "*Caticaá s. Polypodium Brasiliense Pisonis* [lib. iv., fol. 233] but since the latter author describes his plant as having "*caules cubitum alti*," its identity must be questioned.

Polypodium radice tenui & repente of Plumier [Descr. Pl. Am. 25. *pl. 36.* 1693, and Fougères de l'Amer. 60. *pl. 77.* 1705] reported from San Domingo, and *Polypodium minus*, etc. [Sloane, Cat. Pl. Jam. 16. 1696, and Nat. Hist. Jam. 1 : 79. 1707] refer also to our plant. Plumier says of this fern "*J'ay rencontré plusieurs fois cette Plante dans les forests de l'isle Saint Domingue. C'est le petit Polipode à pinnules rares & cendrées par dessous du Sr. Sloane Cat. Plant. Jamaic. 16.*"

The name given to it by Morison [Pl. Hist. 3 : 563. sec. 14.

[No. 9, Vol. 5, of Torreya, comprising pages 155–170, was issued September 23, 1905.]

pl. 2. f. 5. 1715] is also characteristic: *Polypodium minus Virginianum foliis brevioribus subtus argenteis;* he says of his plant "*Elegantem hanc speciem è Virginia acceptam habemus.*" It is recorded from this region also by Gronovius [Fl. Virg. 2: 198. 1743] who described it under the name *Acrostichum fronde pinnata*, etc.

In 1753, Linnæus described the species under the name *Acrostichum polypodioides* but it is well-nigh certain that Plumier's synonym cited under *Polypodium virginianum* properly belongs here. Linnæus' remark, however, under the latter species, "*antecedenti* [*i. e., P. vulgare*] *simillima, sed minor, & subtus glabra*" pertains undoubtedly to some small form of *P. vulgare*, so common in the Potomac Valley and elsewhere. This view was held by the illustrious Willdenow, who makes this statement in regard to *P. virginianum:* * * * "*Ex America boreali semper P. vulgare sub hoc nomine accepi.*" [Willd. Sp. Pl. 5: 174. 1810.]

The Jamaican plant described by Patrick Browne and named *Polypodium ferruginosum* by Linnæus [Sp. Pl., ed. 2, 1525. 1763] has been referred by later authors to the species in question.

Swartz described the species from the West Indies under the name *P. incanum* [Sw. Prodr. 131. 1788; Fl. Ind. Occ. 3: 1645. 1806; Syn. Fil. 35. 1806] giving as hab. "*adnascitur truncis vetustis in montibus summis Jamaicae.*"

We find the plant under still another name, *P. ceteraccinum*, in the works of Michaux [L. C. Rich.; Michx. Fl. 2: 271. 1803] who records it as "*parasiticum in Kentucky, Tennassée, Florida.*"

Bory de Saint-Vincent included the species in his genus *Marginaria* [Dict. Class. Hist. Nat. 6: 587. 1824; 10: 176. 1826], which name is evidently the earliest generic name for Polypodium species having scaly fronds and the sori along the margin. In 1828, the same author applies this generic name to one of his species *Marginaria minima* [Duperrey, Voy. 2[1]: 264. *pl. 31. f. 2.* 1828] of which he says: * * * "*très voisine de celle que les botanistes ont communément appelée Polypodium incanum, a été confondue avec elle. Elle en diffère cependant en ce qu'elle est trois ou quatre fois plus petite et d'un aspect bien plus élégant.*"

It is therefore quite evident that the generic concept of *Marginaria* Bory applies to such plants as the species in question

FIG. 1. The Gray Polypody, *Marginaria polypodioides*, from near Washington, D. C.

and, since this group has been recognized as distinct from the *Polypodia*, the genus *Marginaria* Bory merits recognition. J.

Smith referred this group to *Goniophlebium* (§ *Lepicystis*) [Jour. Bot. 4: 56. 1841.] and to genus *Lepicystis* in 1857 [J. Sm. Cult. Ferns 2]. The latter genus has been adopted by Diels [Engl. & Prantl, Nat. Pflanzenfam. 1[4]; 322. 1899] but in a wider sense. In both instances, the scales on the surface of the frond serve as the principal distinguishing character.

The geographical range given for this species extends from the southern United States to Chile and Argentina, and in Africa from the Cape of Good Hope to the Zambesi region. The African plants do not seem to differ sufficiently from ours to merit a distinct specific name. The character upon which *Polypodium Eckloni* Kunze [Linnaea 10: 498. 1836] was founded do not seem to be constant, the frond being described as having the lowest pinnae longer than the upper ones and the upper surface of the frond devoid of scales ("*supra nudis*"). In our American plants the absence of scales on the upper surface of the frond is very uncommon. A few specimens collected in the United States agree perfectly with the description of *P. Eckloni*. In typical plants there are some differences, but apparently not sufficiently marked to warrant segregation. Perhaps when we have more material at hand and know the plants better, the African plant may prove to be a distinct species.

Specimens collected in Brazil and deposited in U. S. National Museum agree with the description of *Marginaria minima* Bory. In these the fronds are at the most 8 cm. high with the pinnae, except the uppermost, nearly of the same length [6 mm., more or less] and subopposite. There is also a marked difference in the scales, those of *M. minima* being acuminate.

Dr. Lindman [Arkiv för Botanik 1: 243. 1903] describes two forms of *P. incanum* from Brazil; one "*plantae parvae*" from Rio Grande do Sul, the other "*plantae maximae*" from Matto-Grosso. There is, therefore, some indication that typical plants are found at least at far south as Central Brazil.

Mr. A. Ernst [Jour. Bot. 3: 323. 1865] reports *P. incanum* growing "*on roofs of houses*" in Caracas, Venezuela. In Costa Rica it grows on coffee-trees [*Tonduz*, 1904]. Mr. W. R. Maxon reports it from Jamaica, as common on rocks and trees

in open or partially shaded situations from the sea-level to about 5,000 feet altitude. Dr. J. K. Small [TORREYA 3: 141. 1903] reports it "from sea-level to almost 4,000 feet altitude on the eastern slopes of the Blue Ridge. * * * It is confined to trees only when rocks are lacking." Mr. C. L. Pollard [Plant World 5: 133. 1902] records a locality discovered by Mr. W. P. Hay, near the Potomac River and within fifteen miles of Washington, D. C.; this is possibly the most northern locality known for this fern. This little colony of plants, from which the figured specimen was taken, grows on a steep rocky slope; it consists of numerous plants matted together and covering many square feet of surface. In this respect it differs from another of the rock-loving ferns, *Cheilanthes lanosa*, which forms small clusters along the fissures of the rocks.

Our specimen is of interest also on account of its forking frond — a rare phenomenon in this species — which, may I state it, holds its own in beauty. *Cheilanthes lanosa* may possibly excel it as an ornament in its native haunts.

WASHINGTON, D. C.

THE ARTIFICIAL INDUCTION OF LEAF FORMATION IN THE OCOTILLO*

BY FRANCIS E. LLOYD

The post-pluvial appearance of foliage within a very short time upon desert plants which remain through periods of drought in a leafless condition is a phenomenon which has very often been remarked. The behavior in this regard is most striking in deserts, where there is prolonged lack of rain. Although in some regions the rain penetrates into the ground very rapidly, nevertheless it has seemed improbable to many, no doubt, that the absorption of this water from the soil alone gives the necessary stimulus to leaf formation. Led by this idea, attempts have been made to find in many of the superficial structures of plants the means for the absorption of water, or water vapor, and it may very well be

* This work was done at the Desert Botanical Laboratory, Tucson, Arizona, under a grant from the Carnegie Institution, of Washington, during the summer of 1905.

that experimental research will in the future throw light upon the extent of adaptation, as evidenced by anatomical structures, to which plants have attained in this matter. It was during a conversation upon such points with Dr. W. A. Cannon at the Desert Botanical Laboratory that the suggestion was made by him that it would be instructive to see if any light could be obtained upon the influence of meteoric water upon the development of leaves in *Fouquieria splendens*, the ocotillo of the southwest. I accordingly planned three experiments which were carried out upon a perfectly leafless plant, all alike in principle, but differing in details. In one case, the only one I shall describe, a reservoir, consisting of a gallon bottle, was attached to the neighboring limbs of a "palo verde," and a siphon arranged to lead water to a string of cheese-cloth, which in turn led the water to a bandage of the same cloth tied about a stem of the ocotillo three feet from the ground. The fierce winds several times played havoc with my arrangements, but finally I managed to adjust the apparatus to the swinging of the stems by allowing slack in the cheese-cloth string. The siphon ended in a capillary tube, so that the flow of water was small and, while it ran down the ocotillo stem at times, it did not reach the ground in any case. The reservoir was replenished daily, but the flow of water was discontinuous. The result was, of course, a closer simulation of the actual occurrences at the time of the rainy season.

The first run of water was applied on the morning of the first of July, and this was repeated each day. The stem was thus kept more or less wet for half the time. On the evening of the fourth, the leaves along 12–15 inches of the stem below the bandage showed marked development, being 1 centimeter long; and by the sixth of July, at three P. M., their length was 1.5 centimeters. On July 9, the largest leaves were 2 centimeters long, and the branch in question, together with its neighbors were photographed (FIG. 1). In looking at this picture one must realize that all the stems shown were at first equally leafless. It will be instructive to compare the above facts with those observed after rain.

On July 11, at 5 P. M., we had the first shower of the rainy

season, the amount of precipitation being one and one-tenth inches within two hours, drenching, of course, all the vegetation. On the following day (the 12th) at four P. M., it was quite evident to the eye that the buds had made a start. By July 13, the slender conical buds along the whole extent of the stems were 7 to 8 millimeters long. On July 14 at five A. M., the rosettes of leaves were well formed; the length of the largest leaves was 1.5 centi-

FIG. 1. *Fouquieria splendens*, showing a branch which had been irrigated during four days.

meters, their size being, however, quite uniform. On July 15, the photograph forming the second figure was taken. It will be noted that the leaves on the irrigated stem were at that time much larger than the freshly formed leaves, that is, those produced after the rain, and as a result of the stimulus thereby given.

It will be noted that the development after the rain was more rapid than after irrigation, notwithstanding that the water was applied artifically from time to time during the period of growth under observation, while the wetting by rain occurred but once. The fact, however, must not be lost sight of, that following the rain there is a marked rise in the relative humidity, though I re-

gret that I did not take observations on this point at the position of the plant. Then, too, the ground got a good soaking, and it is remarkable how rapidly the soil becomes moist for a considerable depth. Undoubtedly this fact was contributory to the rapid growth of the post-pluvial foliage. In the experiment detailed above, the total growth in a few days was due wholly to the water available on the surface of the stem, and the inference is not strained, I believe, if we conclude that, normally, the first stimulus to growth in the leaves is due to the water taken up, probably, at or near the buds. In view of the very thick coating of waxy

FIG. 2. *Fouquieria splendens* — the same as in FIG. 1, three days after a rain.

bark it seems unlikely that the water would find entrance elsewhere, though we may be wrong in this, since there are rifts through which conceivably the water might enter.

It may also be noted that the buds of the ocotillo are minute, sometimes indeed scarcely visible, and covered by, at most, a few light-brown, thin, chaffy scales. The repeated loss of leaves at the same place results in a rough area surrounding the base of the bud at which water may, we may well believe, be taken up. There is otherwise no evidence of the presence of any special adaptive

structures to this end, and their absence in a very marked desert type of plant is not to be overlooked. That the absorption of water by the stem is of no very great importance, if any, in the economy of the ocotillo, may perhaps well be maintained ; while on the other hand we might argue that in regions where the rain is very scarce the very rapid production of foliage would be of so great importance that even the little water absorbed would be equally so. At any rate, the question here barely touched upon is one of a host of similar ones which need elucidation by constant study under just such special conditions as are to be found in the desert.

Teachers College, Columbia University.

AN OLD SWAMP-BOTTOM

By Edward W. Berry

We all make our pilgrimage to the swamp : the lover of flowers for the pink lady's-slipper, giant rhododendron, fragrant pogonia and Indian tea-kettle (*Sarracenia*) ; the collector for these and for coptis, the sun-dew, and the ferns and sedges that haunt the inaccessible tangles of verdure which no swamp ever lacks. There are swamps and swamps, but all are of unfailing interest, whether the pilgrim be botanist, entomologist, or merely a seeker for cranberries or blueberries. They have equally their vernal and autumnal coloration. In the spring, the violet and marsh-marigold ; in the fall, the closed gentian and bidens.

No swamp is of more interest than a fossil swamp, and it is my purpose to take you on a little journey to one such — not to one of those gigantic examples of buried marshes where in the far-off Carboniferous age was laid down the world's supply of coal, but to the remains of one of those smaller swamps that flourished during the Cretaceous and was like the many swamps that dot the country at the present time, where the mosquito and hyla flourish and the magnolia blooms.

Going back a few million years, three to five is a reasonable estimate, we come upon a time when deposition was active along

our eastern coast; a time when the clays and sands of the Raritan formation were being laid down and a long-continued series of fresh or lacustrine deposits had culminated by a slow sinking of the land, which presently substituted marine conditions. The series of beds comprising the Cliffwood clays and Magothy sands represents the results of this transition period. In one locality clays were forming while close by sands were being deposited.

All through these beds we have abundant evidence that the adjoining land supported a luxuriant vegetation, and that this land was not far removed from the area of sedimentation; possibly we have to do with a series of islands or inlets, which would well explain the varying character of the deposits and the contained plant remains. This evidence is furnished by the abundance of sulphates and carbonates of iron, the dark color of the clay due to carbonaceous matter, the layers of lignite intercalated with the sand beds, and to thicker layers of lignite which are everywhere present. Some of these lignite beds have all the appearance of having been old swamp-bottoms.

In mining the overlying and underlying clays, immense logs of lignite are uncovered, lying as if overwhelmed by a sudden influx of sediment. I have seen logs of this sort three or four feet in diameter and what was left of them, ten feet or more in length, and if the statements one hears about the pits are to be relied upon, much larger remains are often uncovered.

Such a lignite bed in the pits of the Cliffwood Brick Company has interested me exceedingly. It is situated on Whale Creek about a mile southwest from Raritan Bay, in Monmouth County, New Jersey. The lignite consists of matted vegetation but slightly triturated, showing a mixed mass of partially decayed leaves, bits of sticks and small stems, scales of cones and various fruits and seeds, exactly such things as you would find at the bottom of some woodland pool at the present time. One never tires of the fascination of breaking open these lignite masses, exposing the faint impression, perhaps of a large leaf, or the remains of what was a button-ball in the far-off days, or the thousand and one evanescent promises of what was once definite living matter.

Exposure after such a long entombment soon reduces these lignite masses to fragments. A satisfactory way to study their flora, however, is to bring away large pieces of the lignite and macerate them in water at leisure moments, when they may be easily separated into their component parts and any remains of definite shape can then be more readily seen.

Distributed through the lignite beds are little globules and tear-shaped masses of amber; one hears of large masses being found occasionally, but the largest piece that I have taken out is

FIG. 1. Some of the fruits, seeds, twigs and cone scales washed out of the lignite.

about the size of a lima bean. This amber is the fossil resin of some of the trees of the period, the weight of the evidence pointing to the *Sequoia*, as little leafy twigs of two or three species are found all through the lignite, while cones occur elsewhere in the neighboring clays.

A clay pit is a most desolate looking place all the year round. Under a scorching July sun, with the thermometer standing at over 100° and no shade, one has a perfect imitation of an oven, and the imagination almost fails to picture the verdure of this identical spot in the ancient days. Here flourished tall sequoias and plane-trees, close by grew ancient spruces and cycads and semi-tropical ferns. In the spring, the magnolia and sheep-berry bloomed. In the fall, the figs ripened, and the autumnal tints of the oak and maple vied with the vernal coloration.

Besides the larger pieces of stems and fragments of leaves as well as an abundance of needles of *Sequoia* and *Cunninghamites*,

I have found the following: Twigs of *Juniperus hypnoides* Heer and *Sequoia Reichenbachi* (Gein.) Heer; aments of probably a *Sequoia;* eight or ten varieties of seeds; several varieties of fruits, including *Myrica* and *Platanus;* leaves of *Brachyphyllum;* five or six varieties of cone scales, including *Dammara* and *Picea;* and a miscellaneous assortment of undeterminable remains.

Maryland Geological Survey,
Baltimore, Md.

MESADENIA LANCEOLATA AND ITS ALLIES

By Roland M. Harper

In the genus *Mesadenia* Raf. (*Cacalia* L. in part) there is a small group of species growing in moist places in the coastal plain of the southeastern United States and flowering in late summer, characterized by terete stems, leaves with parallel or subpinnate primary veins, and involucral bracts not keeled. These plants are distinguished from each other by comparatively slight morphological characters, but differ more in range and habitat.

The first published species of this group is *M. lanceolata*, described by Nuttall in 1818 from specimens collected in Georgia and Florida (presumably in the maritime counties) by Dr. Baldwin. Its leaf-blades are glaucous, especially beneath, and lanceolate to oblanceolate in outline.

In 1822 Elliott described a plant collected by himself on his trip to the Alabama territory, identifying it with *Cacalia ovata* Walt. According to Elliott's description, and specimens which have since been collected in the same general region, this plant differs from Nuttall's *Cacalia lanceolata* chiefly in having leaf-blades nearly as broad as long; but its range and habitat are so different that there is little danger of confusing the two species in the field.

But the identity of Elliott's *Cacalia ovata* with Walter's is by no means certain, since the former is not now known east of the Ocmulgee River, while the latter presumably came from South Carolina. There are also some serious discrepancies between Elliott's description and that of Walter, as was noted by Torrey

and Gray, who retained the name *ovata* for the plant described by Elliott, and referred Walter's description doubtfully to *Cacalia tuberosa* Nutt., a species chiefly confined to the Mississippi valley, as far as we know at present. In 1892, MacMillan (Met. Minn. 555) went a step further and formally substituted Walter's specific name for Nuttall's *tuberosa*, transferring it at the same time to *Senecio*, in which the original species (*atriplicifolia*) was placed by Hooker.

But *C. tuberosa* is not known to range farther east than Alabama, so it is highly improbable that Walter ever saw it. His description is rather unsatisfactory, as usual, but what there is of it will apply much better to *Cacalia sulcata* Fernald,* a recently described species allied to *C. tuberosa*. This, too, has a restricted range, being known as yet only from Southwest Georgia and West Florida, but the chances of its being found hereafter in the vicinity of Walter's home are doubtless greater than in the case of the two comparatively well-known plants just discussed.

From the foregoing it is pretty evident that the plant described by Elliott is now without a name, so I have provided one for it below.

A third member of the *lanceolata* group is common in moist pine-barrens in some of the "wire-grass" counties of Georgia (see TORREYA, 5: 114, second line from bottom). It differs from *M. lanceolata* in having shorter leaves, which are not at all glaucous but yellowish-green throughout, and being scarcely more than half as tall. Its range seems to be entirely distinct, for I have seen it only in the Altamaha Grit region, and *M. lanceolata* only in the flat country south and east of there. A plant described by Elliott from specimens sent from Louisville, Georgia, by James Jackson, and doubtfully referred to *Cacalia lanceolata*, was probably the same as mine from the Altamaha Grit region. Louisville is not in this region, but Mr. Jackson may have collected the *Mesadenia* some distance south of Louisville, as he is believed to have done in the analogous case of

* Bot. Gaz. 33: 157. 1902. See also Bull. Torrey Club 30: 342. 1903; 31: 27. 1904. *Mesadenia dentata* Raf. (New Fl. N. A. 4: 79. 1836), described from Alabama, is possibly synonymous with this.

Pentstemon dissectus Ell.* Elliott describes the leaves as "slightly glaucous underneath," but they appear more so in the dried state than when living. For the present it seems best to treat this bright-green plant as a variety rather than a species, since its chief character is scarcely distinguishable in herbarium specimens.

The nomenclature and known distribution of these three plants may be summarized as follows:

Mesadenia Elliottii

"*Cacalia ovata* Walt."; Ell. Bot. S. C. & Ga. **2**: 310. 1822. T. & G. Fl. N. A. **2**: 435. 1843; Chapm. Fl. S. U. S. 244. 1860; Wood, Class-Book, 463. 1861; Gray. Syn. Fl. **1**^{2}: 395. 1884.

"*Mesadenia ovata* (Walt.) Raf." Small, Fl. S. E. U. S. 1301. 1903.

Grows mostly in damp woods, ranging from Georgia and Florida to Louisiana in the coastal plain. Elliott said of it: "Grows in the western parts of Georgia.† Common in the highlands near the Alabama." Wood reported its having been collected in the vicinity of Macon, Ga., by Dr. Mettauer. Dr. Mohr reported it from Lee and Montgomery counties in the Cretaceous region of Alabama, which is probably just about where Elliott saw it. In Georgia I have seen it in the counties of Houston, Early and Berrien (*no. 1701*), and only in places where the Lafayette formation seems to be absent. I have examined the following specimens besides my own:

GEORGIA: Without further data, *Boykin*. "Clearing in edge of swamp near Smithville," Aug. 26, 1901, *A. H. Curtiss* (*no. 6884*).

FLORIDA: Middle Florida, *Chapman* (*no. 325*).

ALABAMA: Vicinity of Auburn, Lee Co., several collections by *Earle* and others, without indication of habitat.

MISSISSIPPI: Mendenhall, Simpson Co., Aug. 18, 1903 (without further data), *S. M. Tracy* (*no. 8671*).

* See Bull. Torrey Club 32: 166, 167. 1905.

† Presumably near the fall-line, and probably not far from Columbus. See Bull. Torrey Club, 31: 12. 1904.

Louisiana: Without further data, *Leavenworth.* "Damp valleys in pine woods, Feliciana. August," *Wm. Carpenter.*

Mesadenia lanceolata (Nutt.) Greene,* Pittonia 3: 182. 1897. *Cacalia lanceolata* Nutt. Gen. 2: 138. 1818.

In Georgia I have seen this in flat damp pine-barrens in McIntosh (especially around Darien Junction), Glynn, and Brooks (*no. 1631*) counties. In Alabama Dr. Mohr reported it from Mobile and Baldwin counties, in various situations varying from moist pine-barrens to brackish marshes. (Dr. Chapman gave brackish marshes as its only habitat.) Specimens examined show it to range southward to the Everglades of Florida and westward to Louisiana.

Mesadenia lanceolata virescens var. nov.

Stem 9–10 dm. tall; leaves yellowish-green on both surfaces, not glaucous, the lowest 16–18 cm. long. Otherwise much like *M. lanceolata.*

Apparently confined to the Altamaha Grit region of Georgia, where it grows in moist pine-barrens, with both Lafayette and Columbia formations present. Flowers in September and October. It is represented in my collections by *no. 664*, collected September 19, 1900,† and *no. 1678*, collected September 26, 1902, both from Tifton, Berrien county. I will designate *no. 1678* as the type because I have distributed more specimens of it than of the earlier number, but the two collections are absolutely identical, their stations being only a few feet apart.

I have noted the same plant also in the counties of Dodge, Telfair, Appling, Coffee, Wilcox, Irwin, Dooly, Worth, Colquitt and Thomas; and I have little doubt that it grows also in Bulloch, Emanuel, Tattnall and Montgomery, which counties I have not yet visited at the proper season for identifying it. Jackson's plant mentioned by Elliott, if it is the same as mine, probably came from Emanuel County.

College Point, N. Y.

* The authorship of this combination is usually credited to Rafinesque, but he gave neither description nor synonyms.

† See Bull. Torrey Club, 28: 459 (first paragraph). 1900.

NEWS ITEMS

Professor John M. Coulter, of the University of Chicago, sailed for Europe on October 7, expecting to remain abroad until next April.

Mr. George V. Nash, of the New York Botanical Garden, lectured October 21 at the Field Columbian Museum, Chicago, on "Hayti, the Negro Republic."

Mr. Louis Harman Peet, author of "Trees and Shrubs of Prospect Park," and "Trees and Shrubs of Central Park," died suddenly at his home in Brooklyn on October 18.

"A Nature Study of Maryland Plants," is the title of an attractively illustrated and popularly written pamphlet by Frederick H. Blodgett, which has recently appeared as vol. 2, no. 1 of the Maryland Agricultural College Bulletin.

The program of the autumn lectures of the New York Botanical Garden, to be delivered in the lecture hall of the Museum Building, Bronx Park, on Saturday afternoons, at 4:30 o'clock, is as follows: October 7, "Autumn Features of Native Trees and Shrubs," by Dr. N. L. Britton; October 14, "Botanical Explorations in Hayti," by Mr. Geo. V. Nash; October 21, "The Faculties of Plants," by Dr. D. T. MacDougal; October 28, "A Summer in the Desert," by Professor Francis E. Lloyd; November 4, "The Sea-Gardens of Tropical America," by Dr. M. A. Howe; November 11, "Farming and Fruit-Growing in Cuba," by Dr. W. A. Murrill; November 18, "Fossil Plants," by Arthur Hollick; November 25, "Tropical Fruits," by Professor H. H. Rusby.

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THE PLANT FORMATIONS OF THE ADIRONDACK MOUNTAINS

By John W. Harshberger

Geologically and physiographically, the life-history of the Adirondack Mountains has been long and complex. Commencing at some period of Archean time, long before the beginning of the known geologic record, they have maintained a land condition almost, if not quite, down to the present time. Since the earliest time many thousands of feet of strata have been removed, until now the various elevations stand revealed to us in a planed-down character. We now find them to be mountains of considerable elevation, somewhat rugged in outline, but much less rugged than the Andes, Alps, or Rocky Mountains. There are few lofty, inaccessible cliffs, but instead, rounded, easily scaled hills and mountain peaks, reaching only very rarely to a height greater than one mile above sea-level. This rounded form has been emphasized by the scouring action of the ice of the glacial period, which covered the highest peaks of these mountains. Mt. Tahawus (Mt. Marcy) is the highest peak (5,344 feet) and Mt. McIntyre comes next (5,112 feet).

The plant formations have been developed in the period of time since the retreat of the glacial ice-sheet. One can clearly trace the sequence of development, not only in the conversion of lakes into bogs and bogs into mountain meadows, but also in the forest formations and associations themselves. The following brief account presents the result of a study of these formations made in the summer of 1904, when the author had the pleasure of botanizing with Dr. Oscar Drude, professor of botany in the Dresden Technical High School and director of the Royal Botanic Garden, Dresden. The elevations were determined by

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Professor Drude, who brought an aneroid barometer with him to America.

Deciduous Forest Formation.— The forest at the base of Mt. Tahawus along the Au Sable River and about the Au Sable lakes, according to my observations, consists of the following dominant species: * *Betula lutea*, *Fagus americana*, *Acer saccharum*, *Tsuga canadensis*, *Thuja occidentalis*, *Pinus Strobus*, *Abies balsamea* and *Betula papyrifera* (the *Fagus-Acer-Betula* facies), while as secondary trees grow *Acer rubrum*, *Acer pennsylvanicum*, *Populus tremuloides*, *Sorbus americana* and beneath the latter *Viburnum alnifolium*, *Rubus odoratus* and *Viburnum cassinoides*. Such are called in Adirondack phraseology, hardwood lands, which occupy in general the elevated flats and slopes where the deciduous-leaved trees are the characteristic species. *Acer saccharum*, *Betula lutea* and *Fagus americana* attain their best development on these lands, while *Tsuga canadensis* is of inferior quality to that found on the moister soil of lower ground.† Along the Au Sable River, near its source, in a deep gorge were found in association *Acer saccharum*, *Tsuga canadensis* and *Betula lutea* as the dominant species, while the beech, *Fagus americana*, seems to have a crown which never rises quite above that of the trees mentioned (*Tsuga-Fagus* facies). The herbaceous plants of the forest floor are *Viola rotundifolia*, *Tiarella cordifolia*, *Medeola virginica*, *Mitchella repens*, *Unifolium canadense*, *Clintonia borealis*, *Trillium undulatum*, *Streptopus amplexifolius*, *Pyrola chlorantha*, *Oxalis Acetosella*, *Aralia racemosa*, *Dalibarda repens* and *Lycopodium lucidulum*. *Taxus canadensis* forms a secondary element in the *Tsuga-Fagus* facies. *Polypodium vulgare* forms mats in undisputed possession of the tops of boulders, while the rock sides are distinguished by the presence of species of *Umbilicaria*. *Dryopteris noveboracensis* forms extensive patches in the deep recesses of the forest.

The shores of lower Au Sable Lake, which are mountainous and steep, are covered with *Betula papyrifera* associated with *Abies balsamea* and *Populus tremuloides*, while near the upper end

* Names according to Britton's Manual, 1901.

† Pinchot, G. The Adirondack Spruce, 12. 1898.

of this lake grow *Sorbus americana*, *Picea Mariana* and *Acer saccharum*, and *Thuja occidentalis* becomes more abundant and virtually supplants the paper birch, *Betula papyrifera*. The vegetation of the forest floor here consists of *Clintonia borealis*, *Oxalis Acetosella*, *Osmunda Claytoniana* (= *O. interrupta*), *O. cinnamomea*, *Chiogenes hispidula*, *Unifolium canadense* and *Veratrum viride*.

The forest about Raquette Lake is a mixed one of broad-leaved and coniferous trees, the latter predominating. Such are the spruce flats of the lumbermen, where the soil is fresh and deep, with *Picea Mariana* (= *P. rubens* Sargent), of medium height and diameter. These flats form the lower limit of *Acer saccharum*, which is common on higher ground. *Abies balsamea* is small. The principal species, in the order in which they occur, are: *Picea Mariana* (= *P. rubens* Sargent), *Betula lutea*, *Abies balsamea*, *Tsuga canadensis*, *Fagus americana*, *Acer saccharum* and *Pinus Strobus* (*Picea-Betula* facies). With these are associated *Thuja occidentalis*, *Picea Mariana*, *Larix americana*, *Pinus resinosa*, *Acer saccharinum* (= *A. dasycarpus*) and *Betula populifolia*, with scattered *Fraxinus americana* and *Prunus serotina*. *Populus tremuloides* and *Prunus pennsylvanica* are found on the burned-over land with an undergrowth in the primeval forest of *Viburnum alnifolium*, *Acer pennsylvanicum* and *Acer spicatum*. Here, the characteristic swamp species are *Picea Mariana* (red spruce = *P. rubens* Sargent), *Abies balsamea*, *Picea Mariana* (black spruce), *Pinus Strobus*, *Larix americana*, while on the gravelly knolls in the swamps occur *Pinus Strobus*, *Tsuga canadensis*, *Picea Mariana* (= *P. rubens* Sargent), *Abies balsamea*, etc. *Thuja occidentalis* and *Larix americana* grow on the poorest drained land.*

The forest about Tupper Lake is characterized by *Picea Mariana* (= *P. rubens* Sargent), *Acer saccharum*, *Fagus americana*, and *Betula lutea*. The sugar maple, *Acer saccharum*, and beech, *Fagus americana*, have the advantage over *Betula lutea* on the

* Hosmer, R. S., and Bruce, E. S. A Forest working Plan for Township 40. Bulletin 30, Division of Forestry, U. S. Department Agriculture. 1901.

Graves, H. S. Practical Forestry in the Adirondacks, Bulletin 26, Division of Forestry. 1899.

better soils, because the latter is less tolerant of shade. The following list shows the relative degree of tolerance beginning with those that require the most light: *Larix americana*, *Populus tremuloides*, *Prunus pennsylvanica*, *Pinus Strobus*, *Betula lutea*, *Acer rubrum*, *Abies balsamea*, *Picea Mariana* (= *P. rubens* Sargent), *Tsuga canadensis*, *Fagus americana* and *Acer saccharum*, while the best soils support *Fagus americana*. *Acer saccharum* and species in general may be arranged according to edaphic requirements, beginning with the most requiring: *Prunus serotina*, *Acer saccharum*, *Fagus americana*, *Acer rubrum*, *Pinus Strobus*, *Abies balsamea* and *Picea Mariana* (= *P. rubens* Sargent).

As one ascends, the facies in some places consists of the deciduous species mentioned with such ferns and herbs on the ground as *Adiantum pedatum*, *Polystichum acrostichoides*, *Monotropa uniflora*, *Chiogenes hispidula*, *Clintonia borealis*, *Cornus canadensis* and *Panicularia elongata*. At 3,600 feet, especially on the southern flanks of Mt. Tahawus, the forest formation consists of *Picea Mariana* (red spruce = *P. rubens* Sargent), *Betula lenta*, *Betula lutea*, *Sorbus americana*, *Abies balsamea* and *Thuja occidentalis*; and *Veratrum viride* occurs on the forest floor with *Vaccinium canadense*, *Lycopodium annotinum*, *L. lucidulum*, *Aster acuminatus*, *Solidago flexicaulis*, *Coptis trifolia*, *Linnaea americana* and *Streptopus amplexifolius*. *Solidago flexicaulis* may be the lowland representative of the alpine *Solidago alpestris*.

Coniferous Formation.— These southern slopes are the spruce slopes, according to the designation of the lumbermen, because *Picea Mariana* (= *P. rubens* Sargent) is dominant. The absence of *Acer saccharum*, *Acer rubrum* and *Viburnum alnifolium* is due to elevation and is noteworthy. *Abies balsamea* on an elevated saddle of the mountain forms a pure forest with shrubby and herbaceous companions (*Abies* facies), and in open swampy places surrounded by the balsam occur *Osmunda cinnamomea* and *Veratrum viride*.

The "Krumm-holz," or dwarf timber, is reached at 5,000 feet (1,530 m.) on Mt. Tahawus (Mt. Marcy). Here *Abies balsamea* is about five feet high, with its base covered by *Hypnum splendens*, *H. Crista-castrensis* and *Dicranum* sp., with *Linnaea americana*,

Chiogenes hispidula and *Cornus canadensis* beneath, while *Vaccinium canadense* and *Sorbus americana* are prominent shrubs. At 1,550 meters trees are only 1–2 feet high, and disappear entirely, being replaced in exposed places by *Ledum groenlandicum*, *Vaccinium uliginosum* and *V. caespitosum* (*Vaccinium-Ledum* association), *Empetrum nigrum* (*Empetrum* association), *Alnus alnobetula* (*Alnus* association), and in sheltered places are found *Spiraea salicifolia*, *Gentiana linearis*, *Veratrum viride* and *Linnaea americana*.

Alpine Plant Formation. — The plants on the bare top (5,300 feet), collected by the writer,* are *Coptis trifolia*, *Viola blanda*, *Arenaria groenlandica*, *Oxalis Acetosella*, *Sibbaldiopsis tridentata*, *Rubus strigosus*, *Sorbus americana*, *Spiraea salicifolia*, *Ribes prostratum*, *Cornus canadensis*, *Linnaea americana*, *Houstonia caerulea*, *Solidago alpestris*, *Nabalus Bootii*, *Vaccinium caespitosum*, *V. pennsylvanicum*, *V. pennsylvanicum angustifolium*, *V. uliginosum*, *Oxycoccus Oxycoccus*, *Chiogenes hispidula*, *Chamaedaphne calyculata* (*Cassandra calyculata*), *Ledum groenlandicum*, *Kalmia glauca*, *Rhododendron lapponicum*, *Rhinanthus Crista-Galli*, *Trientalis americana*, *Diapensia lapponica*, *Gentiana linearis*, *Empetrum nigrum*, *Betula glandulosa*, *Alnus alnobetula*, *Salix Uva-Ursi*, *Abies balsamea*, *Veratrum viride*, *Eriophorum vaginatum* and *Lycopodium Selago*. A singular lichen, *Thamnolia vermicularis*, attracts the attention by its pure white color, and its cylindric, hollow sharp-pointed podetia 2–4 inches long, growing among mosses and on the thin soil of the mountain-top under sterile conditions. It is more plentiful, according to Professor Peck, on Mt. McIntyre than on Mt. Tahawus (Mt. Marcy). *Lonicera coerulea* ascends almost to the top of the mountain. It occurs behind the sheltering rocks but a short distance south of the signal station. *Carex Bigelovii* is the only sedge on the highest part of the mountain.†

Bog Formation.—Two small marshy areas form a part of the open summit of Mount Tahawus. One is a decided depression

* The ascent was made by Professor Drude and the writer on August 26, 1904.

† Peck, C. H. Plants of the Summit of Mt. Marcy. Bulletin New York State Museum 5: 657. 1899.

in the northeast slope ; the other is on the eastern slope and is much nearer the top of the mountain. Here were found by me, *Kalmia glauca*, *Ledum groenlandicum*, *Oxycoccus Oxycoccus*, *Eriophorum vaginatum*, *Veratrum viride*, *Vaccinium uliginosum* and several species of *Carex*.

Giant Mountain (4,622 feet) is not bare at the summit, except where shelving rocks occur. Here were found by me *Ledum groenlandicum*, *Arenaria groenlandica*, *Marchantia polymorpha* (in burned areas), *Agrostis rubra*, *Vaccinium pennsylvanicum*, *Linnaea americana* and *Cornus canadensis*. The summits of lower mountains, Mt. Hopkins (3,136 feet) for example, are not above timber-line, but frequently they are bare owing to rock exposures. On this mountain, a smooth rock surface is found, in the broken parts of which grow *Sibbaldiopsis tridentata* (*Sibbaldiopsis* association), while *Vaccinum uliginosum* (*V. uliginosum* association), *Alnus alnobetula* (*Alnus* association), *Vaccinium pennsylvanicum*, *V. pennsylvanicum angustifolium* and *V. canadense* are found along the edge of the forest, which consists at this elevation of *Picea Mariana*, *Betula papyrifera*, *B. lenta*, *Prunus pennsylvanica*, *Acer pennsylvanicum*, *Pinus Strobus*, *Populus tremuloides*, *Thuja occidentalis* and *Abies balsamea*, that reach to the top of the mountain.

Hemlock Formation. — The hemlock, *Tsuga canadensis*, forms a pure forest upon the ridges at the foot of Giant Mountain. Here the beech, *Fagus americana*, *Acer rubrum* and *Acer pennsylvanicum* are subordinate species with a few spruce trees (*Picea*) intermixed. The herbaceous undergrowth is typical of such forests, consisting of *Linnaea americana* (in mats), *Mitchella repens*, *Cornus canadensis*, *Pyrola chlorantha*, *Oxalis Acetosella*, *Clintonia borealis*, *Peramium repens* (*Goodyera repens*), *Medeola virginica*, *Pyrola secunda*, *Viola rotundifolia*, *Chimaphila umbellata*, *Gaultheria procumbens*, *Coptis trifolia*, *Unifolium canadense*, *Cypripedium acaule*, *Lysias orbiculata* (*Habenaria orbiculata*) and *Lycopodium lucidulum*. This is the same association of species that one finds in southeastern Pennsylvania under the hemlocks, with the addition in the Adirondacks of *Linnaea americana*, *Clintonia borealis* and *Coptis trifolia*.

In more elevated situations, on Giant Mountain, one finds the forest to consist of *Picea* sp. and *Abies balsamea*, together with *Betula papyrifera*, *Acer rubrum*, *Betula lenta* and *B. lutea*, with a fern, *Dennstaedtia punctilobula* (= *Dicksonia pilosiuscula*), abundant, together with *Ribes prostratum* and *Rubus strigosus* (*Picea* facies).

Pinus resinosa, in a few localities, as on the southeastern slopes of Baxter Mountain (2,400 feet), makes a formation (*Pinus resinosa* formation). Sometimes *Pinus Strobus* is intermingled with *Juniperus communis alpina* together with *Vaccinium pennsylvanicum*, *V. canadense* and *Pteridium aquilinum* on the rocks (*Juniperus-Vaccinium* association). Near these rocks grow *Populus tremuloides*, *Amelanchier oligocarpa*, *Betula papyrifera*, *Spiraea salicifolia* and *Diervilla trifida*. The two pines dominate the southwest slopes of Baxter Mountain down to the lowest ridges, where *Quercus rubra*, *Acer pennsylvanicum*, *Tsuga canadensis* are in association, finally changing below to *Tsuga canadensis*, *Fagus americana*, *Abies balsamea* and *Acer saccharum*.

The ponds, or small lakes of the Keene Valley neighborhood, are fringed by *Chamaedaphne calyculata*, *Cornus alternifolia*, *Thuja occidentalis*, *Betula papyrifera*, *Abies balsamea*, *Picea Mariana* (= *P. rubens* Sargent) and *Pinus Strobus*, together with *Galium asprellum* and *Impatiens biflora*, while in the shallow water occur *Nymphaea advena* (*Nuphar advena*), *Lobelia Dortmanna*, *Eriocaulon* sp. and *Sparganium simplex* (lake-plant formation). The ferns of the forest, near such ponds, are *Polypodium vulgare* (on boulders), *Adiantum pedatum*, *Botrychium virginianum* and *Polystichum acrostichoides*.

Rock-Gorge Formation. — This is typically developed in the Au Sable Chasm in the northern part of the Adirondack area. The Au Sable River has cut a narrow gorge, or occupied a fault, with almost straight sides and a few overhanging shelves of rock. Along the crest of the precipices and in the gorge, according to my observations, are found *Pinus resinosa*, *Betula papyrifera*, *Tsuga canadensis*, *Thuja occidentalis*, *Betula lutea* and *Acer rubrum*, while somewhat back from the gorge together with the above-mentioned trees are *Pinus Strobus*, *Betula populifolia*,

Quercus rubra, *Q. alba* and *Q. nigra*, beneath which occur *Amelanchier canadensis*, *Hamamelis virginica* and *Gaylusaccia resinosa*. The rock crevices show *Campanula rotundifolia Langsdorfiana*, *Polypodium vulgare*, *Aralia racemosa*, *Rubus odoratus* and *Ribes rotundifolium*, and, on the ledges, clumps of *Rubus strigosus*.

University of Pennsylvania.

A KEY TO THE BROWN SESSILE POLYPOREAE OF TEMPERATE NORTH AMERICA

By William A. Murrill

The pileate species of Polyporaceae have been recently grouped under three subfamilies; the Polyporeae, with porose hymenium and annual hymenophore, the Fomiteae, with porose hymenium and perennial hymenophore and the Agariceae, with furrowed hymenium. The plants treated in the present key are Polyporeae with brown context and without a distinct stipe.

Key to the Genera.

Hymenophore sessile.
- Spores hyaline.
  - Context light-brown.
    - Context at first fleshy, becoming slightly corky. **A.** Ischnoderma.
    - Context tough from the first.
      - Surface encrusted. **B.** Antrodia.
      - Surface not encrusted.
        - Surface glabrous or nearly so.
          - Hymenium alveolate. **C.** Favolus.
          - Hymenium normally poroid. **D.** Hapalopilus.
        - Surface distinctly hairy. **E.** Funalia.
  - Context dark-brown.
    - Context friable. **F.** Phaeolus.
    - Context tough.
      - Tubes entire, pileus heavily bearded. **G.** Pogonomyces.
      - Tubes soon splitting into teeth, pileus velvety. **H.** Cerrenella.
- Spores brown. **I.** Inonotus.

A. The Species of Ischnoderma.

Plant large, brown, resinous. *I. fuliginosum* (Scop.) Murr.

B. The Species of Antrodia.

Plant small, brown, zonate, encrusted. *A. mollis* (Sommerf.) Karst.

C. The brown Species of Favolus.

Plant thin, smooth, purplish-zonate. *F. variegatus* (Berk.) Murr.

D. The Species of Hapalopilus.

1. Hymenium concolorous; pileus smooth, azonate; context soft and friable. *H. rutilans* (Pers.) Murr.
   Hymenium differently colored; pileus rarely smooth; context rigid or corky, not friable. 2.
2. Hymenium lilac-colored, tubes 1 cm. or more in length; pileus concentrically sulcate. *H. sublilacinus* (Ell. & Ev.) Murr.
   Hymenium dark-brown, tubes shorter. 3.
3. Context rigid; pileus azonate or with few and indefinite markings. *H. gilvus* (Schw.) Murr.
   Context flexible; pileus plainly and definitely multizonate. *H. licnoides* (Mont.) Murr.

E. The Species of Funalia.

Plant thick and firm; a northern species. *Funalia stuppea* (Berk.) Murr.
Plant thin, soft and flexible; found in Louisiana and Florida. *Funalia villosa* (Sw.) Murr.

F. The Species of Phaeolus.

A large brown spongy plant, usually stipitate, but with puzzling sessile forms. *P. sistotremoides* (Alb. & Schw.) Murr.

G. The Species of Pogonomyces.

A plant easily known by its dense covering of rigid hairs and minute firm pores. *P. hydnoides* (Sw.) Murr.

H. The Species of Cerrenella.

Hymenium concolorous, teeth bright-brown in color. *C. tabacina* (B. & C.) Murr.
Hymenium of a different color from the pileus, teeth covered with a greenish bloom. *C. coriacea* (B. & Rav.) Murr.

I. The Species of Inonotus.

1. Spores deep-brown in color. 2.
   Spores faintly tinted with brown. 3.
2. Surface hirsute, tubes luteous. *I. hirsutus* (Scop.) Murr.
   Surface conspicuously tomentose, tubes not luteous. *I. perplexus* (Peck) Murr.
   Surface glabrous or finely tomentose. *I. dryophilus* (Berk.) Murr.
3. Plants soft, anoderm; found on living shrubs. *I. amplectens* Murr.
   Plants hard, becoming encrusted; found on dead wood. *I. radiatus* (Sowerby) Karst.

New York Botanical Garden.

ON THE OCCURRENCE OF DAUCUS CAROTA IN HAITI

By Norman Taylor

During a recent trip to Haïti, a rather remarkable example of the adaptability of our common wild carrot to tropical conditions was noticed at Marmelade, a small town about fifty miles from the north coast. At an approximate elevation of 2,000 feet I found a field very fairly covered with this weed. It was not a case of its recent introduction in corn or hay, as the town is much too far from the sea, and the natives much too poor to import seeds or forage from other countries.

In colonial times, however, a great deal of Indian corn and seeds of all kinds were taken to the island, and it is only in this way that we can plausibly account for the substantial colonization of the plant. It must have maintained itself for a hundred years or more, and I later had evidences of its migratory tendencies. Along a tiny stream which runs very close to the road from Marmelade to San Michel, an occasional plant was noticeable for ten or fifteen miles, until we came out to a xerophytic plain, where all traces of it were lost. It would be interesting, at some future time, to go over this area again and ascertain how far it had spread

This is not the first time this troublesome weed has been reported from the West Indies, as I find in the herbarium of the New York Botanical Garden a specimen collected at Guadeloupe ; Père Duss' *no. 4015*.

With the somewhat unusual occurrence of this *Daucus* in mind I began looking for other northern species, which from previous reports * might be expected in Haïti, and I was not disappointed. In Marmelade, among what passes for the paving stones of a Haïtian street I found a single plant of *Taraxacum Taraxacum* (L.) Karst. Whether, from the sterility of its environment, the great heat of the sun, or from a combination of these causes, I do not know, but the plant was much stunted,

* Wilson, P. Some introduced Plants in Cuba. Torreya 4 : 188. 1904.

the scape very short, and the head twisted and otherwise deformed.

I found, also, a normal plant of *Plantago major* L. at Plaisance, at an elevation of about 2,200 feet.

A close watch of the country adjacent to the sea-coast failed to bring to light any of these species, and it would seem that it is only in the comparatively cool air of the mountains that they were able to survive.

New York Botanical Garden.

SHORTER NOTES

Tomophagus for Dendrophagus. — My attention has been kindly called by Mr. C. V. Piper to the fact that the generic name *Dendrophagus*, recently used for a new genus of the Polyporaceae (Bull. Torrey Club, **32**: 473. 1905), was assigned by Toumey in 1900 to a slime-mould causing the disease known as "crown-gall" (Bull. Univ. Ariz. Agric. Exper. Sta. **33**: 7–64. *f.* 1–31. 1900). I therefore substitute the name **Tomophagus** for the one preëmpted, with **Tomophagus colossus** (Fr.) as the type.

William A. Murrill.

New York Botanical Garden.

The Gray Polypody in Ohio. — In the October number of Torreya, in the article "Notes on the Gray Polypody," the author, Ivar Tidestrom, states (p. 175) that "*This is possibly the most northern locality for this fern*" — referring to the station noted by C. L. Pollard, at which place, "near the Potomac River and within fifteen miles of Washington," the plant was found by W. P. Hay.

I have a station for the plant which I take to be a little farther north than that mentioned above. At any rate it may be of sufficient interest to report that this fern was collected in 1900 in the northern part of Adams County (Ohio) at a place called Beaver Pond. I also found plants at the village of Mineral Springs, a short distance from the former locality. In the Ohio State Herbarium we have a specimen collected at Batavia Junction, Hamilton County, by Dr. Byrnes, and one collected at Plainville, close to the preceding station, by Mr. Langden.

W. A. Kellerman.

A LACINIATE RUBUS.— Dr. Greene's suggestive paper on *Rhus bipinnata* leads me to recall an instance within my own knowledge, which may throw light on the origin of a cultivated plant. Many years ago I found in a hedge of *Rubus rusticanus*, in Kent, England, a single plant which bore laciniate leaves, but did not seem to differ otherwise from true *rusticanus*. In *Science Gossip*, August, 1889, I gave some account of it, and proposed to call it *R. rusticanus* var. *incisus*. Later I sent a specimen to Kew, and it was identified as *R. laciniatus* Willd., a well-known garden plant of uncertain origin. It appears to me nearly certain that the plant of *incisus* originated where I found it, from *rusticanus* ancestry; but it can hardly be doubted that *R. laciniatus* itself had a like history, at some time and place now wholly forgotten.

T. D. A. COCKERELL.

BOULDER, COLORADO.

DUPLEX NAMES. — In my work over a Patagonian flora I have been compelled to face the problem of giving twin names to species whose original specific names have been raised to generic standing. Provisionally and under protest, I have accepted such names, and even added to the list. But I have never been satisfied with the system which they represent; and I am satisfied that Turczaninow would not have erected the new genus *Ugni* for Molina's old species *Myrtus Ugni*, if he had foreseen as its outcome the ultimate name *Ugni Ugni* (Mol.) Macl., a system that duplicates priorities for the old specific name and extinguishes the priority of the other part of the first name.

As the question was re-opened at the recent International Botanical Congress in Vienna, I venture to submit, not for immediate acceptance, but for consideration, and for acceptance, if approved, the following rule — Whenever a specific name of a plant has been promoted so as to become its generic name, then the previous generic name shall be demoted so as to become the new specific name; the original authority to be parenthesized. Thus the species which I have reluctantly called *Ugni Ugni* (Mol.) should become **Ugni Myrtus** (Mol.), the priority of both the primitive names being in this case preserved. This rule would give **Fagopyrum Polygonum** (L.), **Sassafras Laurus** (L.), etc.

I cannot forecast how the proposal will strike experienced botanists; but it appears to me to be at least worthy of their consideration.

GEORGE MACLOSKIE.

PRINCETON UNIVERSITY,
October 10, 1905.

REVIEWS

Campbell's Mosses and Ferns*

The second edition of Professor Campbell's work on the mosses and ferns will, we are sure, be welcomed by botanists, since the earlier book has been for some time out of print. The value of this book has by no means been small, and its extension to over a hundred pages beyond the limits of the original production, together with the changes made necessary by recent advances in our knowledge, will make it still more useful. Typographically, the new edition is not up to the standard of the first. Cuts which appeared clean-cut before are now blurred, a result no doubt partly due to the damage done to the blocks during storage, and partly to inferior printing.

Among the more noticeable changes in the descriptive part of the work we note that the author adopts the view that the Anthocerotes are coördinate in rank with the Hepaticae and Musci, and that the treatment of this interesting segregate is fuller. The practical limitations of book-making have prevented excursions into detail which, however desirable, would easily have doubled the volume in size. Nevertheless, the author has deemed it well to deal somewhat fully with the maturer phases of the sporophytic generation in the more highly organized groups with which he deals, so far as the scope of his task would permit. We are of the opinion that in many instances he has been led into retailing very well-known or easily attainable information, accessible in many reference books. To this slight extent the descriptions smack of compilation without sufficient critical knowledge of the more obvious points of structure,

*Campbell, D. H. The Structure and Development of the Mosses and Ferns (Archegoniatae). 8vo. 1–657. *f.* 1–322. New York, The Macmillan Company. 1905. Price, $4.50.

points which, though readily observable, cannot be said to be the less important. The reviewer may speak only of those matters of which he claims to have some personal knowledge and would cite the instance on pages 493–4 where *Lycopodium volubile* is said to have but four rows of leaves in common with *L. complanatum.* This is an error, but one which is made also in the "Pflanzenfamilien" of Engler and Prantl. So also the statement that in some species the leaves are of two kinds, that is, dimorphous. As a matter of fact, the leaves on the foliage shoots of *L. alpinum* are of three kinds, those on the dorsal and ventral surfaces being markedly different from each other and also from the lateral ones. Those among us who chiefly disregard matters lying without the range of microscopic vision would complain rather loudly were similar misapprehension of the structure and variety of, say, archegonia, to obtain, but it is difficult for some minds at least to see that error attaching to the observation of, humanly speaking, large things is any less to be shunned.

There are welcome additions to the older book in the form of a discussion of alternations of generations, and a brief but suggestive chapter on fossil archegoniates. In the former we are glad to notice that there is an indication of a tendency to seek for physiological explanations of the remarkable facts of alternation of generations — this in the last few paragraphs.

The book, we may say in closing, is the product of much study and betokens a dashing vigor of mind which attains the large ends in view, and it should continue to be an important stimulus to a better knowledge of the forms which botanists in this country know rather too little about.

F. E. Lloyd.

Farlow's Bibliographical Index of North American Fungi*

The magnitude of the work begun by Professor Farlow under the above title is apparent from the fact that this first part, consisting of over three hundred pages, covers only the genera anterior to *Badhamia* in the alphabetical sequence. In the inter-

*Farlow, W. G. Bibliographical Index of North American Fungi. Vol. 1. Part 1. Carnegie Institution of Washington, Publication No. 8. 1905. 8vo, i–xxxv + 1–312.

esting preface is a history of the circumstances under which the conception of such a work originated and developed. "North America" is construed in its widest sense, including the West Indies, Bermuda, and the continent north of the Isthmus of Panama. The species are arranged alphabetically under their respective genera and the citations of literature are disposed chronologically under each. The literature lists impress one as being very full, though any attempt to make them complete is modestly disclaimed; they have been compiled with the idea of lightening the labor of the systematic mycologist and papers of a purely technical or agricultural bearing and many of a physiological character have been omitted. The Bacteria and Saccharomycetes are not included.

In a work dealing so largely with plant names, the author's views on the "scabrous subject" of nomenclature are of especial interest and one is not disappointed in finding them tersely and forcibly expressed in the preface, partly as follows: "At the present day the Sylloge of Saccardo and the Pflanzenfamilien of Engler and Prantl may be said to be the two works on the classification of fungi in most general use, and we have preferred to follow them as far as possible. * * * There are two categories of botanists: those who believe that nomenclature is an end rather than a means, to whom the changing of names to adapt them to a uniform, automatic system, seems to be the important aim in science; and those who regard nomenclature as a necessary evil which can be mitigated by making as few changes as possible. Of these two categories, it is hardly necessary to say that we should prefer to be classed with the latter. * * * It is best not to make too violent attempts to interpret the older mycologists but to be content with letting the dead bury their dead. The business of reviving corpses has been carried altogether too far in mycology." After perusing this conservative platform, one is slightly shocked to find the author adopting *Albugo* of S. F. Gray, revived by Otto Kuntze and by Schröter, for the genus for which the name *Cystopus* had become "classic" in both taxonomic and morphological literature — a name which the next International Botanical Congress, if the committee having the

matter in hand happens to be suitably constituted, may place upon its list of *nomina conservanda*. This support of a Kuntzean innovation by one who prefers to be classed among those who change names as little as possible inclines us to the belief that the line of division between his "two categories of botanists" is perhaps as elusive as the limits of some of the currently accepted genera of the larger fungi. It is a pleasure to note that the oldest specific name is maintained, — a practice which, happily, already has the sanction of most mycologists. The author's remark that *Agaricus campestris* L. is the type of the genus *Agaricus* is of interest in connection with Dr. Murrill's recent action in taking *Agaricus quercinus* L. as the type and thus transferring the name *Agaricus* to the genus ordinarily known as *Daedalea*.

Critical notes and comments are numerous — mostly written by the author but partly by Mr. A. B. Seymour, whose coöperation in the work receives a special acknowledgement in the preface. The "Bibliographical Index of North American Fungi," as planned and thus, in part, executed, will prove a valuable time-saver and aid to American mycologists and will receive from them a most grateful welcome.

MARSHALL A. HOWE.

PROCEEDINGS OF THE CLUB

OCTOBER 10, 1905.

This meeting was held at the American Museum of Natural History, with President Rusby in the chair and twenty-two persons present.

A letter was read from Mr. Edward W. Berry, tendering his resignation as recording secretary of the Club owing to his removal to Baltimore. Dr. Chamberlain moved that the resignation be accepted and that a letter be sent to Mr. Berry, expressing to him the Club's high appreciation of his services and the regret of the Club at his removal. This motion was carried by a unanimous vote.

The announced program for the evening consisted of informal

reports on the summer's work and observations. Several from whom reports were expected were unable to be present.

Professor Francis E. Lloyd gave an account of his summer's experiences at the Desert Botanical Laboratory of the Carnegie Institution at Tucson, Arizona. On the way thither a visit was made to the Tularosa Desert in southern New Mexico. This desert is largely an old lake-bed of a comparatively recent geological period. The moving white sands which compose the desert overlie the *mesa* and consist chiefly of gypsum, and a little below the surface there is a considerable amount of available water, which, however, is saline. The vegetation of the region is peculiar, showing various adaptations to the intense light. Several interesting cases were observed showing how Yuccas and other plants are able by continued vertical growth to keep their tops above the drifts of sand and how in the process they help to build up and hold the dunes. *Rhus trilobata* and also a shrubby labiate form very marked pillar dunes. The gypsum sand is partly soluble and it solidifies about the vertically elongating roots and stems; the outer parts of the dune may then erode and be removed by the wind, leaving an isolated pillar-like mass surmounted by the tops of the living shrubs. An interesting and not especially common plant of the region of Tucson is *Cereus Greggii*, of a habit so peculiar and aberrant that it does not seem to be a *Cereus* at all. Like certain other desert plants it has an underground storage system which is very large in comparison with the above-ground parts. The rapidity with which foliage appears on desert plants after rains has been often noted and it has been a question in how far growth of leaves may be stimulated by the direct access of water to the above-ground parts without the intervention of the root-system. This point was tested during the past summer by experiments at the Desert Botanical Laboratory. By means of a siphon, water was supplied directly to the leaf-buds and stems, in such a way as to prevent the water from reaching the ground. It was found that the desert plants thus stimulated produce leaves in the course of a few days. Very noticeable changes occur within twenty-four hours, both when plants are stimulated as described and after natural irrigation by

rains. Professor Lloyd further observed diurnal nutations and nyctitropic movements in an amaranth growing near the Desert Laboratory. Photographs were shown illustrating the observations commented upon.

Dr. William A. Murrill spoke briefly of his collections of fungi during the summer at Ohio Pyle, Pennsylvania, in the District of Columbia, and in the Mt. Katahdin region of Maine, describing also some of his camping experiences in the Maine woods. Dr. Murrill was impressed by the boreal character of the fleshy fungi found about Mt. Katahdin, many of them recalling species that he had collected in Sweden.

President Rusby reported on a Torrey Club excursion to Pompton Plains, New Jersey, where *Capnoides flavulum* was among the rare plants obtained; also on a club excursion to Great Island, New Jersey. Great Island is a hummock of sand surrounded by a salt marsh and lying between Newark and Elizabeth; it has numerous interesting plants, some of them being characteristic of the pine-barren flora of the region further south.

Professor E. S. Burgess remarked upon his summer's visit to the Pacific Coast. Collections and field studies of asters were made in New Mexico, Arizona, California and Oregon. Mt. Hood, Oregon, proved an especially interesting field. Asters were found growing there in close proximity to snow and ice.

Mrs. Britton alluded briefly to collecting experiences in Bermuda during September. Most of the species of ferns, mosses and hepatics are found there only in the "caves" or sink-holes. Her collections indicate considerable additions to the list of mosses published in the Report of the Challenger Expedition.

Dr. J. H. Barnhart spoke of the International Botanical Congress held at Vienna in June, which he attended as a delegate from the New York Botanical Garden.

Adjournment followed.

MARSHALL A. HOWE,
Secretary pro tem.

NEWS ITEMS

Dr. J. N. Rose and Mr. J. N. Painter, of the U. S. National Herbarium, returned to Washington late in September from a three or four months' collecting expedition to Mexico.

Mr. William R. Maxon, of the U. S. National Herbarium, has been spending a month at the New York Botanical Garden engaged in a study of Central American and West Indian ferns.

Dr. Charles F. Millspaugh, of the Field Columbian Museum, Chicago, was at the New York Botanical Garden for two weeks in the latter part of October and the first part of November, studying some of his collections of Bahamian plants.

Mr. H. A. Gleason, A.M., recently instructor in botany in the University of Illinois, is pursuing graduate studies in botany in Columbia University. Mr. Harlan H. York, A.M., recently assistant in botany in the Ohio State University, is the present incumbent of the fellowship in botany in Columbia University.

Roland M. Harper, Ph.D. (Columbia, 1905), who has been occupied with botanical studies at Columbia University and the New York Botanical Garden for a large part of the last six years, has accepted a position with the Geological Survey of Alabama, with headquarters at University, Ala. He will be engaged for several months in a study of the economic plants of that State and also, incidentally, of some phytogeographical problems.

In the Ludwick Institute courses of free lectures on the natural sciences and their applications, under the auspices of the Academy of Natural Sciences of Philadelphia, the program for 1905–1906 includes a course of five lectures in November and December by Dr. John W. Harshberger under the general title of a "Scientific Account of Marvelous Plants" and a course of five lectures in February and March by Mr. Stewardson Brown on "Wild Flowers and Seasons."

Botanical visitors in New York since July 15, not otherwise mentioned in TORREYA, include P. L. Ricker, Washington, D. C.; Dr. Robert B. Wylie, Morningside College, Sioux City, Iowa; Professor F. L. Stevens, Raleigh, N. C.; Eugene A. Rau, Bethlehem, Pa.; C. O. Rosendahl, University of Minnesota; S. H.

Burnham, Albany, N. Y.; Professor George Macloskie, Princeton University; President Ezra Brainerd, Middlebury College, Middlebury, Vt.; Perley Spaulding, St. Louis, Mo.; Dr. Duncan S. Johnson, Johns Hopkins University, Baltimore, Md.; Dr. E. H. Eames, Bridgeport, Conn.; W. H. Blanchard, Westminster, Vt.; David G. Fairchild, U. S. Department of Agriculture; and Professor George E. Stone, Amherst, Mass.

Mr. R. S. Williams returned to New York on October 24 from a two years' visit to the Philippine Islands, where he has been making botanical collections for the New York Botanical Garden. His collections, which include spermatophytes, pteridophytes, bryophytes and lichens, have been secured in central and northern Luzon, in southern Mindanao and in Jolo. Mr. Williams had the misfortune to lose the results of about three months' work by a fire, but his collection remains one of the most extensive and doubtless the best in quality of any that have been brought from the Philippines.

Vol. 5 No. 12

TORREYA

December, 1905

A STATISTICAL METHOD FOR COMPARING THE AGE OF DIFFERENT FLORAS

By Roland M. Harper

It is a well-known principle of phytogeography that when an area devoid of vegetation and true soil, such as one which has recently been covered with water or ice for a long period, is first invaded by plants, the lower forms tend to predominate at first, and gradually pave the way for higher ones.* It is also generally conceded by botanists that monocotyledonous plants as a class are of lower rank than dicotyledons. Putting these two conceptions together, a method is at once suggested for determining roughly the age of a given flora, for a study of the relative proportion of monocotyledons and dicotyledons in any essentially homogeneous region ought to throw some light on the length of time that that region has been continuously occupied by vegetation.† The application of this method, crude as it may seem, gives some remarkably consistent results for regions believed to be of the same age geologically.

The glaciated region of the northern states is believed to have been entirely devoid of vegetation — at least as far as flowering plants are concerned — as late as fifteen or twenty thousand years ago ; and most of the coastal plain of the southeastern states was probably submerged beneath the sea at about the same time.

* Prof. N. S. Shaler's very interesting paper on "The origin and nature of soils" (12th Ann. Rep. U. S. Geol. Surv., pp. 213 et seq.) should be consulted in this connection.

† This method is so simple that it can hardly be claimed as original, but it probably has not been applied to so many different parts of Eastern North America before. MacMillan came very near it in some of the statistical discussions in his "Metaspermae of the Minnesota Valley" in 1892, but did not use it for comparison in this way.

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The floras of these two regions ought therefore to be among the most recent in existence. The southern Alleghanies and adjacent Piedmont region, on the other hand, have probably been continuously covered with vegetation ever since the Palaeozoic period, a time long antedating the appearance of any species of plants now living.

Below are given the proportions of monocotyledons to the total number of species of angiosperms in several parts of temperate Eastern North America whose floras have been written up with some care. After the name of each region are given the author and date of the flora from which the statistics were derived, and then the percentage of monocotyledons. It is of course only native plants that are of significance in this connection, but in some local floras no distinction is made between native and introduced species. So two columns of percentages are given, one for native species alone and the other for native and introduced.

The regions in the first list are wholly included in the glaciated region.

	Native	Native and Introduced
Maine (Fernald, 1892),		29
Vermont (Brainerd, Jones & Eggleston, 1900),	35.7	32.3
Essex County, Massachusetts (Robinson, 1880),		30.6
Middlesex County, Massachusetts (Dame & Collins, 1888),	35	30.6
Worcester County, Massachusetts (Jackson, 1894),		28.4
Amherst and vicinity (Tuckerman & Frost, 1875),	34.3	32.2
Connecticut (Bishop, 1901),		30
New Haven and vicinity (Berzelius catalogue, 1878),		29.2
Southington, Connecticut (Bissell & Andrews, 1902),	31	28
Cayuga Lake basin, New York (Dudley, 1886),		31.8
Monroe County, New York (Beckwith & Macauley, 1896),		30
Michigan (Beal, 1904),		30
Minnesota Valley (MacMillan, 1892),		28.4

New Jersey is about half coastal plain and the remainder of the state mostly glaciated. The corresponding figures for it (Britton, 1889) are 33.2 per cent. and 29.3 per cent.

The following areas lie wholly in the coastal plain:

	Native	Native and Introduced
Dismal Swamp and vicinity (Kearney, 1901),		30.9
Vicinity of Wilmington, N. C. (Wood & McCarthy, 1887),		28.6
Okefinokee Swamp and vicinity (Harper, ined.),		29.3

	Native	Native and Introduced
Altamaha Grit region of Georgia (Harper, 1906),	30	29.6
Florida (Hitchcock, 1899–1901),		28.4
Lee County, Florida (Hitchcock, 1902),		34.9
Plaquemines Parish, Louisiana (Langlois, 1881),		29.4
Lower Louisiana (Langlois, 1887),		28.5

It is rather unfortunate that local floras of parts of Eastern North America which include neither coastal plain nor glacial drift are not numerous. There is not yet even one for the southern Alleghanies from which any such calculations as these can be made. The following regions, however, include none of the Pleistocene areas above mentioned, or such a small proportion of them that it does not seriously impair the results.

	Native	Native and Introduced
Chester County, Pennsylvania (Darlington, 1853),	27	25.7
West Virginia (Millspaugh, 1892),	21.8	20.6
West Virginia (Millspaugh & Nuttall, 1896),		20.7
Tennessee (Gattinger, 1901)		24
Jackson County, Missouri (Mackenzie & Bush, 1902),		27
Athens and vicinity, Middle Georgia (Harper, 1900),	19.8	
Metamorphic region of Alabama (Earle, 1902),	26.7	25.6

In this list some of the percentages which are higher than the averages are capable of explanation. In Chester County, Pennsylvania, Muhlenberg's work on the grasses and sedges of the vicinity early in the century may have had something to do with the relatively high proportion of monocotyledons recorded. And in Earle's Flora of the Metamorphic Region of Alabama the southern boundary of the region is so loosely drawn (as the author admits in his preface) that a considerable coastal plain element is included.

The discrepancies between different figures in any one of these three lists may be due as much to personal equation as anything else, and it is remarkable that they are not greater. But with all sources of error included, the above statistics nevertheless seem to show that no glaciated or coastal plain area contains less than 30 per cent. of native monocotyledons, while none of the older regions has more than 27 per cent. If authors of future local floras will bear this method in mind and tabulate their species

accordingly we can ultimately determine how universally this relation holds good. It is interesting to note that in every case above where both figures are given there is a smaller proportion of monocotyledons among the introduced species than among the natives.

In applying this statistical method to other regions some cautions must of course be observed. For instance, extreme accuracy could not be expected where the number of species involved is much less than a thousand. And it would hardly be advisable to compare areas too widely separated, for the proportion of monocotyledons may vary considerably on different continents, or in different climatic zones.

A similar method applied to different habitats in the same region indicates roughly not the age of the flora of each habitat but its affinities with other regions and its place in the order of succession. In the Altamaha Grit region of Georgia for instance, the flora of river-bluffs, which represent the extreme of mesophytic conditions for that region and have about 90 per cent. of species in common with the Piedmont region and mountains, contains only 13 per cent. of monocotyledons. On the other hand the moist pine-barrens have only about 20 per cent. of their species ranging beyond the limits of the coastal plain, and 44 per cent. of monocotyledons.

Some other kinds of statistics may perhaps hereafter be found equally useful for the same purposes. For example, the ratio of Gamopetalæ to Polypetalæ, of grasses to sedges, or of woody plants to herbs. In the glaciated region and coastal plain, sedges seem usually to outnumber the grasses, while the reverse is true in most other parts of the world; and woody plants tend to be more numerous in old regions than in new, if the climatic conditions are not too different.

ARTIFICIAL COLORING OF FLOWERS

By Henry Kraemer

In the *Popular Science Monthly* for August there is an interesting account of "A Visit to Luther Burbank" by Professor de Vries, and in commenting on the production of a blue poppy by Burbank he advances the idea that "probably the change in color is caused by the combination of pigments in some flowers and the chemical constituents of cells of others." For several years I have been making a study of the color substances of plants both chemically and microscopically, and my results have led me to suppose that changes in the colors of flowers could be effected by cultural methods, that is, by feeding the plants with certain chemicals. For about a year I have been carrying on experiments along this line, but so far have obtained no marked results. This may be due to the fact that I have not yet attained exact control conditions, or that the proper chemicals have not been used, or we may find that it is not possible radically to change any of the so-called inherent characters of plants, of which color is one.

In the course of my work I have also become interested in the artificial coloring of flowers. I have used both plant color-substances and aniline dyes, obtaining the most satisfactory results with the latter class of substances. Aqueous solutions of these dyes were supplied the living plant through the soil, or stems of cut flowers were placed directly in the solutions. While I have actually succeeded in getting the growing plant to take up some of these substances under control conditions, as in the production of a blue carnation, the most striking results have been obtained with cut flowers. When the flowers are not too far advanced even though they have been cut several days, the effects are frequently observed in from 10 to 15 minutes, and usually in less than an hour the maximum effects are obtained. Apparently all white flowers will take up the dyes which I shall enumerate, being changed to yellow, orange, blue, green, purplish-red or magenta, crimson, purple, salmon-pink and gray.

These dyes may be used also to intensify flowers having a pale color, as of pale-yellow carnation, pink rose, etc. In some cases the natural colors can be modified, as in the production of a yellowish-red flower of snapdragon from a yellow flower. In the accompanying table the following data are given :

1. The colors produced in white flowers when the stems are placed in aqueous solutions of the dyes.
2. The common names of the dyes.
3. The composition of the dyes.
4. The colors of the dyes or mixtures used.
5. Colors of the aqueous solutions.

Color Produced in White Flowers.	Common Name of Dye.	Composition of Dye.	Color of Dye or Mixture.	Color of Aqueous Solution.
Canary yellow.	Acid Yellow A. T. (C).	Sodium salt of disulpho-diphenylazin-dioxytartaric acid.	Bright orange-yellow.	Golden-yellow.
Orange.	Orange G. G. (C).	Sodium salt of benzene-azo-B-naphthol-disulphonic acid.	Yellowish- or carmine-red.	Brownish-red.
Blue.	Cyanole F. F. (C).	Sodium salt of metaoxy-diethyl-diamidophenyl-ditolyl-carbinol-disulphonic acid.	Dark-blue.	Deep purplish-blue.
Green.		A mixture of equal parts of Acid Yellow A. T. and Cyanole F. F.	Deep bluish-gray.	Dark-green.
Purplish-red or magenta.	Acid Magenta (C).	Sodium salt of the trisulphonic acid of rosaniline.	Deep-brown.	Purplish-red.
Crimson.		A mixture of equal parts of Acid Yellow A. T. and Acid Magenta.	Yellowish-brown.	Crimson.
Purple.		A mixture of equal parts of Cyanole F. F. and Acid Magenta.	Grayish-blue.	Purple.
Salmon-pink.	Brilliant Croceine M. O. O. (C).	Sodium salt of benzene-azo-benzene-azo-B-naphthol-disulphonic acid.	Brick-red.	Light-crimson.
Pale salmon-pink.	Crystal Scarlet 6 R. (C).	Sodium salt of a naphtylamine-azo-B-napthol disulphonic acid.	Reddish-brown crystals with golden reflect.	Rose-red.
Dark gray or blackish.	Naphtol Black B. (C).	Sodium salt of disulpho-B-naphthalene-azo-A-naphthalene-azo-B-naphtol-disulphonic acid.	Bluish-black.	Deep violet.

These dyes are readily soluble in water, and the solutions are made by simply dissolving the dye in water, the proportion being about $\frac{1}{8}$ ounce of dye to 1 pint of water. This solution can be diluted as much as ten times and still be effective. When the desired effect has been produced, which is usually in an hour or less, the flowers should be transferred to water. The solutions will keep for some days, and a pint of solution will color a large number of flowers.

While the artificial coloring of flowers in the manner described is of more or less interest from the scientific point of view, it has also a practical application. In decorative schemes where a particular color is selected, this method could be used for producing flowers all of one color. Or in some instances, where the demand for flowers of a certain color is greater than the supply, artificially colored flowers could be produced from white ones. Then again in the production of novelties, as of green carnations and green roses, the method can be utilized. The color produced by Naphtol Black B is a delicate gray or grayish-black, and it has been suggested that roses and carnations so colored would furnish appropriate mourning flowers. Another use of these dyes is in the coloring of wild flowers for decorative purposes. For example, wild carrot when colored with the blue dye gives a beautiful effect, being suggestive of a head of small forget-me-nots.

Finally it should be stated that the odor of flowers is not affected by this treatment, and that they keep as well as cut flowers ordinarily do. The colors are furthermore, permanent, and when the flowers are preserved in the dried condition, as is sometimes done with hydrangeas, a color can be selected according to the fancy, as blue, green, yellow, red, and so on.

Philadelphia College of Pharmacy.

A KEY TO THE AGARICEAE OF TEMPERATE NORTH AMERICA

By William A. Murrill.

The Agariceae are not ordinary gill-fungi, but are a subfamily of the Polyporaceae with furrowed hymenium. They differ from

the plants usually called agarics in being corky or woody instead of fleshy. Many of the species are very difficult because of the wonderful variations they undergo, especially in the appearance of the hymenium.

Key to the Genera.

Context white.

Surface glabrous, hymenium usually labyrinthiform. A. Agaricus.

Surface pubescent or hirsute.

Hymenium at first labyrinthiform, soon becoming irpiciform. B. Cerrena.

Hymenium lamellate, not becoming irpiciform. C. Lenzites.

Context brown.

Hymenophore sessile, furrows radiate. D. Gloeophyllum

Hymenophore stipitate, furrows concentric. E. Cycloporus.

A. The Species of Agaricus

1. Tubes one to several millimeters in transverse diameter; surface usually brown or discolored. 2.

Tubes less than one millimeter in transverse diameter; surface white or yellowish; plants confined to the southern states. *A. Aesculi* (Schw.) Murr.

2. Pileus thick, triangular, margin obtuse; tubes large, daedaleoid, dissepiments obtuse; context wood-colored; plants abundant on oak and chestnut. *A. quercinus* L.

Pileus thick, triangular, margin obtuse; tubes large, daedaleoid, dissepiments obtuse; context white; plants rare on red cedar. *A. juniperinus* Murr.

Pileus thin, applanate, multizonate, margin very acute; hymenium poroid, daedaleoid or lamelloid, dissepiments acute. *A. confragosus* (Bolt.) Murr.

B. The Species of Cerrena

Surface hairy, hymenium soon splitting into numerous teeth; plants very common on dead deciduous wood. *Cerrena unicolor* (Bull.) Murr.

C. The Species of Lenzites

Surface tomentose, hymenium lamellate; very common on dead wood. *Lenzites betulina* (L.) Fr.

D. The Species of Gloeophyllum

1. Context ferruginous to chestnut. 2.

Context avellaneous to umber, furrows only half a millimeter in width, surface usually azonate. *G. pallidofulvum* (Berk.) Murr.

2. Surface hirsute. *G. hirsutum* (Schaeff.) Murr.

Surface finely tomentose or glabrous. *G. Berkeleyi* (Sacc.) Murr.

E. The Species of Cycloporus

A rare and remarkable plant, easily known by its concentrically furrowed hymenium and central stipe. *Cycloporus Greenei* (Berk.) Murr.

New York Botanical Garden.

SHORTER NOTES

The Cuban Columneas. — The mountains of eastern Cuba contain two species of this genus of Gesneriaceae. *Columnea tincta* Griseb., based on Wright's *no. 358*, collected on tree-trunks in the forest near Monteverde is a climbing vine with a bright-red calyx and yellow corolla; it was found also by Baron Eggers near Pinal de Santa Ana (*no. 5050*), also by Linden on Mt. Liban near Santiago (*no. 1962*), and on El Yunque mountain near Baracoa by *Pollard & Palmer* (*no. 171*) and by *Underwood & Earle* (*no. 1013*).

Columnea cubensis (Urban) Britton (*C. sanguinea* var. *cubensis* Urban, Symb. Ant. 2: 359; *Collandra sanguinea* Griseb., not *Besleria sanguinea* Pers.), based on Wright's *no. 357* from eastern Cuba, is also a vine growing on trees, as observed by Professors Underwood and Earle in collecting their *no. 869* at Cooper's Ranch, base of El Yunque; it was also found by Baron Eggers on the Pinal de Santa Ana (*no. 5049*). A comparison of the specimen collected by *Underwood & Earle* with the Haïtian *Columnea sanguinea* (Pers.) Hanst., as illustrated by *Nash & Taylor*, *no. 1167*, from Mount Maleuvre, shows that the Cuban plant is distinct. I am indebted to Dr. B. L. Robinson for an examination of Wright's specimen.

N. L. Britton.

Astragalus lotiflorus nebraskensis.* — It is a curious fact that the plant described in the *American Naturalist* by me in 1895 should not have been reported by any one since. I have been studying it continuously and have found it since then in four towns and three additional counties of Nebraska: Ainsworth, nine miles from the original find; Callaway, Custer County, eighty to ninety miles south, where it was fairly abundant; Red Cloud, Webster County, three large plants, one hundred miles southeast of Callaway; and in two towns and counties west of Red Cloud, viz.: Naponee, two or three large plants; and Orleans, one plant. In the northern station, *A. lotiflorus* was very common in both forms, the long-peduncled and

* Bates, Am. Nat. 29: 670. 1895.

the short. In this southern station, *A. lotiflorus* has not been found in three years of collecting. As my plant seeds lavishly here, its scarcity cannot be easily accounted for. The Red Cloud plants have all been heavily affected with Astragalus-rust (*Uromyces Astragali*), but the seeds have matured well, at least five hundred on one plant. These southern plants vary in no particular from the original find, except that they average larger, the largest spreading two feet in diameter.

As the result of these studies, and of the use of the term "species" in modern literature, it has seemed best to give the plant specific rank. I am utterly opposed to the subdivision that has characterized *Crataegus* and some other genera of late. But the more I see of this form, the less it resembles *A. lotiflorus*. That is very variable. This is invariable. The resemblance lies in size and color of the flower. If I had found it first here, with its plants of noble size and unassociated with *A. lotiflorus*, I can see that I should not have thought of it as a variety, but as a congener.

It is accordingly now published as **Astragalus nebraskensis** Bates. The name seems most appropriate, and the original description holds good in every particular but the size.

J. M. Bates.

Red Cloud, Nebraska.

A curious Cactus Fruit. — One day early in August an odd looking "joint" of a prickly pear cactus (*Opuntia Engelmannii*) was observed on a plant not far from the laboratory building. It was somewhat smaller than the other joints of the year; like them it was spinose, but instead of being green over the whole surface a portion of it was dark-red. Upon closer inspection the red portion was seen to be somewhat thicker than the remainder and bore a flower scar on its tip. A longitudinal section of the joint showed the red part to be fruit with a red fleshy outer portion and many seeds. The following measurements were taken: Length of joint, 8 cm.; width, 5 cm.; length of the fruiting portion, 3.4 cm.; width, 2.5 cm. A normal fruit from a neighboring plant of the same sort measured in length 4.5 cm., and in width 3.5 cm.

This is the only monstrosity of its kind on this species which has come to my notice. It is of interest to note the resemblance of fruit and joint in such cylindrical opuntias as the cholla (*O. fulgida*), in which there occurs normally and year after year a budding-out from fruits in manner apparently quite like the branching of the joints of the plant. As a consequence of this proliferation and where undisturbed the fruits of cholla are very numerous, forming large clusters. In other opuntias also the fruits bear both spines and prickles and in this habit they recall the purely vegetative part of the plant. Whether, however, the peculiar fruit of the prickly pear above described is to be considered as indicating a caulomic tendency as exhibited by cholla and in other ways by other opuntias might be questioned.*

W. A. Cannon.

Desert Botanical Laboratory,
Tucson, Arizona.

REVIEWS

Christensen's Index Filicum†

The lack of a satisfactory index to the species of ferns has been one of the greatest drawbacks to the systematic study of this group of plants. Moore's attempt‡ in the early sixties proved unsatisfactory and incomplete, since the printing ceased before the genera commencing with the letter G were completed. The parts that were published are not sufficiently exact for present day citation, since dates of publication were rarely given. Salomon's Nomenclator§ was carried through the alphabet but was incomplete at best and gave no citations whatever, thus proving a scarcely useful list of mere names. The need of a thorough index has been so much the more keen (1) since

* Compare also the sketch of *Opuntia Ficus-indica* in Engler & Prantl's Die Natürlichen Pflanzenfamilien, 3^{6a}: 170, in which the fruit is shown sending out roots and new shoots quite like the joints of the plant.

† Christensen, C. Index Filicum, sive enumeratio omnium generum specierumque Filicum et Hydropteridum ab anno 1753 ad annum 1905 descriptorum adjectis synonymis principalibus, area geographica, etc. Hafniae 1905 apud H. Hagerup. [Price 3s. 6d. per fascicle.]

‡ Moore, T. Index Filicum. London, 1857–1863.

§ Salomon, C. Nomenclator der Gefässkryptogamen. Leipzig, 1883.

Hooker & Baker's *Synopsis Filicum* (1867–74), by omitting most synonyms and most species not represented in the Kew herbarium, does not account for more than two thirds of the species now recognized as valid from among those published before 1874; and (2) because the unwonted activity in fern study in the last generation has resulted in adding nearly two thirds as many more species to the list as were recognized in 1874. Baker* attempted to supply this latter deficiency in 1891 in a list of about 1,100 species described between 1874 and 1891, but these were arranged in accordance with the Kew conception of specific sequence, instead of alphabetically, and the work has always been difficult for rapid consultation. Since 1891 more species have been described than in any corresponding period since species-writing commenced.

At last, we have the beginning of a modern, accurate index of the orders Ophioglossales, Marattiales, and Filicales, and the five fascicles (320 pages) already published promise to furnish a much more valuable reference book for the fern students than the corresponding *Index Kewensis* has proved for students of the higher plants, largely because it is being prepared by a fern specialist who is familiar not only with fern literature but with ferns themselves. It gives in alphabetical sequence all names published under each genus, using practically the American system of citation and referring synonyms to the proper genera in the same line. From an American standpoint, the work lacks only one element to make it complete and that is the citation of the type collection number or type locality of the original species described, but this was too much to expect from a European standpoint since the importance of the problem of type localities has not yet permeated European taxonomy as it is sure to do in the near future.

The work is an essential to every student of ferns, and should be in every botanical library. It is the more important that friends of botany should see that subscriptions are placed in

* Baker, J. G. A summary of the New Ferns which have been discovered or described since 1874. Oxford, 1892. [Originally published in Annals of Botany, 5: 181–221, 301–332, 455–500. 1891.]

public and college libraries since the publication is undertaken as a personal venture by Herr Christensen and up to date, only sufficient subscriptions are received to pay for one half the actual expense of printing and its completion is dependent on doubling the present list of subscribers.

The nomenclature is mainly a rational one, following largely *Die natürlichen Pflanzenfamilien* but giving attention to more recent monographic work. It will probably shock some of our more conservative (?) fern students that he takes up *Dennstaedtia*, *Cyclophorus* (for *Niphobolus*), and (following Professor Urban's example from Berlin) *Dryopteris* for *Nephrodium*. Some of the larger genera may prove a surprise in the number of species listed under them, as, for example, *Acrostichum* 750,* *Adiantum* 520, *Alsophila* 380, *Aspidium* 1,400, *Asplenium* 1,600, *Davallia* 360, etc. This will also give some idea of the magnitude of the accurate, painstaking and indispensable work for which the whole fern world is under an eternal debt of gratitude to Herr Christensen.

LUCIEN M. UNDERWOOD.

COLUMBIA UNIVERSITY,
Dec. 14, 1905.

PROCEEDINGS OF THE CLUB

OCTOBER 25, 1905

The Club met at the New York Botanical Garden, with Professor Underwood in the chair and 18 persons present.

The following new members were elected: Dr. C. Stuart Gager, Morris High School; Mrs. Robert T. Morris, 152 West 57th St.; Miss Pauline Kaufman, 173 East 124th St.; Miss Daisy Levy, 329 West 83d St.; Mrs. Henry Dinkelspiel, 254 West 88th St.; Dr. Charles C. Godfrey, 340 State St., Bridgeport, Conn.

The announced program consisted of "Further Remarks on the Vegetation of the Bahamas," by Drs. N. L. Britton and C. F. Millspaugh.

* These are given in round numbers and of course include many species now referred to other genera and many more synonyms of other species in the list. Of the 750 listed under *Acrostichum* only three are printed in the bold-face type which indicates species which still stand under the genus.

Dr. Millspaugh in opening the discussion remarked that the flora of the Bahamas is so locally distributed that all the islands must be visited before a complete enumeration can be attempted, and that a thorough exploration of the archipelago at an early date is very desirable. He then reviewed the history of the exploration of the Bahamas, mentioning the work of Brace, Britton, Catesby, Coker, Cooper, Eggers, Hitchcock, Howe, Madiana, Millspaugh, Nash, Mrs. Northrop, and Swainson (?); and summarizing the work done upon each island.

It is pretty certain that the islands have been all submerged at a very recent geological period, so that the question as to whether they were ever previously connected with the mainland has no significance for the present plant population. The flora seems to have more in common with Cuba and Haïti than with any other region.

Dr. Britton then described some of the noteworthy features of the flora, exhibiting specimens of several of the recently discovered endemic species and of the palms.

Dr. Howe discussed some of the marine algae of the Bahamas, remarking upon the apparently very local distribution of some of the species. He exhibited specimens of a new *Halimeda* and of a new genus, *Cladocephalus*, soon to be described by him in the *Bulletin*.

Dr. Barnhart remarked that he had recently found some evidence about one Swainson, who is supposed to have collected plants in the Bahamas between 1830 and 1842. Some doubts had been expressed as to whether this could have been William Swainson, the zoölogist, who is not known to have been in that part of the world at the time indicated, but the evidence goes to show that the specimens in question had been collected for Swainson by some unknown correspondent, and by him communicated to the herbarium at Kew where they are now found.

Dr. MacDougal exhibited a mounted series of leaves of two hybrid oaks, *Quercus Rudkini* Britton (supposed to be a hybrid between *Q. Marylandica* and *Q. Phellos*), the original specimens of which were recently found to be still growing near Cliffwood, N. J., and *Q. heterophylla* Bartr. (supposed to be a hybrid

between *Q. Phellos* and *Q. rubra*) from Staten Island. The specimens exhibited showed an interesting range of variation, and acorns of both hybrids have been planted, so that they can be studied hereafter in the light of recent theories of evolution.

ROLAND M. HARPER,
Secretary pro tem.

NOVEMBER 14, 1905

This meeting was called to order by President Rusby in the American Museum of Natural History. Twenty persons were in attendance.

Dr. C. Stuart Gager was elected recording secretary to succeed Mr. Edward W. Berry, resigned.

The Rev. John Charles Roper, D.D., 3 Chelsea Square, New York City, was elected to membership.

The scientific program consisted of a paper by Dr. D. T. MacDougal on "Bud-Sports; Occurrence and Hereditary Qualities."

The speaker gave an outline of the subject of bud-sports and described some illustrative cases. Three striking examples from the cultures of the evening primroses in the New York Botanical Garden in 1905 were discussed. In one, a hybrid gave a flowering branch which sported into the characters of a sister hybrid; in the second, a fixed hybrid produced a branch constituting a reversion to one of the parents; a third, a mutant of the common evening primrose, produced a branch which resembled the parental form. Attention was called to the fact that all mutations are essentially vegetative and therefore a greater terminology would necessitate the use of the terms "bud-sport" or "bud-mutant," and "seed-sport" or "seed-mutant." While seed-mutants may theoretically be traced to one cell, it seems difficult to do this in the case of bud-sports. The action of the growing point in the protection of buds was illustrated with diagrams, and an enlarged photograph of one of the bud-sports was exhibited.

The paper was discussed by President Rusby and Professor Lloyd.

Dr. Tracy Hazen exhibited a hybrid between *Asplenium Ruta-muraria* and *A. Trichomanes* from Vermont.

Adjourned until the next stated meeting.

C. Stuart Gager,
Secretary.

NEWS ITEMS

Dr. Nathaniel L. Britton was elected president of the New York Academy of Sciences at the annual meeting held on December 18.

Francis E. Lloyd has resigned his professorship in the Teachers College, Columbia University, to become a member of the staff of the Desert Botanical Laboratory of the Carnegie Institution at Tucson, Arizona.

Professor William A. Kellerman, of the Ohio State University, sailed from New Orleans December 21 for Guatemala, where he will continue his collections and field studies of the parasitic fungi of that region. He is accompanied by a student assistant, Mr. A. W. Smith.

Dr. D. T. MacDougal has resigned his position as assistant director of the New York Botanical Garden to accept that of director of the department of botanical research of the Carnegie Institution of Washington. His address for the coming year will be Desert Botanical Laboratory, Tucson, Arizona, except from May 1 to September 1, when it will be the New York Botanical Garden.

The course of lectures and demonstrations in connection with the nature-study work of the 4 B grade of the public schools of the Borough of the Bronx, begun by the New York Botanical Garden as an experiment last spring, has been continued during the months of October, November and December, and has been extended so as to include also the work of grade 5 B. The exercises have been attended by nearly four thousand different pupils and teachers, those of grade 5 B attending three times, those of 4 B twice. Lectures have been given by N. L. Britton, H. H. Rusby, G. V. Nash, W. A. Murrill and M. A. Howe.

INDEX TO VOLUME V.

New names and the names of new genera and species are printed in boldface type.

Vol. 5 January, 1905 No. 1

TORREYA

A Monthly Journal of Botanical Notes and News

EDITED FOR

THE TORREY BOTANICAL CLUB

BY

MARSHALL AVERY HOWE

JOHN TORREY, 1796–1873

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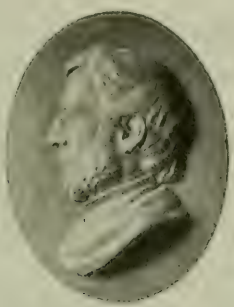

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JOHN TORREY, 1790–1873

CONTENTS

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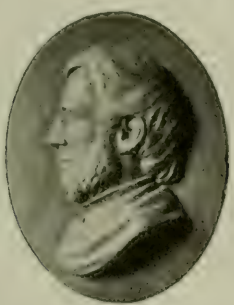

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